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CLINICAL LECTURES

ON THE

PRINCIPLES AND PRACTICE
OF MEDICINE.

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CLINICAL LECTURES

ON THE

PRINCIPLES AND PRACTICE OF MEDICINE

BY

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Philadelphia, New York, Paris, Vienna, Berlin, Stockholm,
Copenhagen, Amsterdam, etc. etc.

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PREFACE.

THIS Second Edition of my Lectures on Clinical Medicine has been greatly extended, and the matter arranged in a more condensed and systematic form. Throughout, I have endeavoured to show the correctness of the principles which have guided my practice by reference to indisputable facts. Hence, every case is authenticated with the name of its reporter in the hospital books.

I have availed myself of numerous illustrations engraved on wood, having been long persuaded that mere description of morbid appearances, and especially of those that are made visible by means of the microscope, communicate only feeble or imperfect ideas to others. Of these illustrations, such as are borrowed have the names of their authors appended; such as have no name attached are original.

To numerous friends (many of them former pupils) I have to express my warmest thanks for aid rendered to me in various ways. But my acknowledgments are especially due to Dr. John Glen, late Resident Physician in the Infirmary, for the time and labour he has bestowed in verifying the accuracy of the statistics of Pneumonia; for the assistance he has afforded me in the compilation of several cases, and for the correction of many sheets during their progress through the press.

Notwithstanding the care which has been bestowed on this work, I am fully aware that it must be imperfect; for to illustrate the entire subject of practical medicine by means of cases in a work of moderate compass, is obviously impossible. Still, sufficient examples, I trust, have been given to illustrate the more important modifications which the advanced state of diagnosis and pathology has effected in the treatment of diseases. I have only to add, that it will give me sincere gratification should I succeed in conveying to others the conviction I myself entertain, that such modifications will be shown by further experience to be not merely temporary changes, but permanent improvements in the practice of the art.

J. HUGHES BENNETT.

EDINBURGH, *February* 1858.

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ERRATA.

Page 100. Line 5 from bottom, instead of "they occasion," read, it occasions.
Page 110. Line 3 from top, instead of "Treviraus," read, Treviranus.
Page 110. Line 7 from top, instead of "complimental," read, complemental.
Page 114. Line 4 from top, instead of "Kupffer," read, Kupffner.
Page 114. In note, line 6 from bottom, "*Salmo salaris,*" read, *Salmo salar.*
Page 115. In note, line 1, instead of "*Salmo salaris,*" read, *Salmo salar.*
Page 147. Line 21 from top, instead of "exudations," read, exudation.
Page 150. Line 12 from bottom, instead of "*eremacusis,*" read, *eremacausis.*
Page 150. Line 11 from bottom, instead of "*Crancum-oris,*" read, *Cancrum-oris.*
Page 165. Foot-note, instead of "Fig. 185," read, Fig. 158.
Page 207. Line 24 from top, instead of "indicate," read, indicates.
Page 216. Line 16 from bottom, instead of "Moncrieff Arnot," read, James Arnot.
Page 216. Line 9 from bottom, instead of "it is," read, they are.
Page 220. Line 2 from bottom, instead of "bladders," read, bladder.
Page 246. Line 7 from top, instead of "embedded," read, embedded in.
Page 257. Add to explanation of Figs. in foot-note, 250 *diam.*
Page 260. Line 13 from top, instead of "has improved," read, have improved.
Page 364. Line 8 from bottom, instead of "never," read, now.
Page 382. First note, instead of "Dublin," read, December.
Page 405. Line 21 from top, instead of "inflamed," read, influenced.
Page 408. Line 4 from top, instead of "is often," read, are often.
Page 560. Line 1 of case, add to date of admission, 1857.
Page 608. Line 3 from top, instead of "to ʒ," read, to ℥j.
Page 622. Line 5 from bottom, instead of "measure," read, measures.
Page 629. Line 19 from bottom, instead of "ʒiv of wine," read, ℥iv of wine.
Page 767. Line 14 from bottom, after the words "infusion of digitalis," add, applied externally.
Page 874. First foot-note, instead of "discoloured," read, decolorized.

CLINICAL LECTURES.

INTRODUCTION.

Gentlemen—The study of medicine has been regarded in a two-fold aspect, as a science and as an art—as regards the theory or the practice; the principles or their application. We can trace the germs of theory and practice in medicine to a very early period. At first, indeed, the art must necessarily have consisted of experience and observation alone. It was Hippocrates who added philosophy and reasoning to experience, and introduced those discussions which led to the overthrow of empiricism, and the final triumph of dogmatism, six hundred years later, in the time of Galen. Since then, although the medical profession has uniformly conjoined the results both of reasoning and experience, each of these two methods has had its favourite supporters. Even at the present day you will find persons who complacently call themselves practical men, and who sneer at all modern advances in pathology. Others are apt to attribute too much importance to theory, and regard with feelings approaching to contempt him whom they denominate a routine practitioner. Hence, unfortunately, it too often happens that practical men are, comparatively, unacquainted with physiology and pathology; whilst those who dedicate themselves to the latter studies are very sceptical as to empirical remedies. On this subject Cullen observed, eighty years ago, what equally applies at present:—"Every one now-a-days pretends to neglect theory, and to stick to observation. But the first is in talk only, for every man has his theory, good or bad, which he occasionally employs; and the only difference is, that weak men who have little extent of ability for, or who have had little experience in, reasoning, are most liable to be attached to frivolous theories; but the truly judicious practitioners and good observers are such as have the most extensive views of the animal economy, and know best the true account of the present state of theory, and, therefore, know best where to stop in the application of it."

If these observations were correct when Cullen wrote, they are far more applicable now, when almost every step that has been made in the art of medicine since his day has been owing to the result of scientific investigation. But, in order to make this proposition clear, allow me, in the first place, to point out what I conceive to be

The Relation of the Science to the Art of Medicine.

If we regard the whole field of human knowledge, and reflect on the differences which exist among the various sciences, we must insensibly be led to classify them into two great divisions, viz. the *exact* and the *inexact*. All the sciences belonging to the first class are characterised by the possession of a primitive fact or law, which, being applicable to the whole range of phenomena of which the science consists, renders its different parts harmonious, and the deductions of its cultivators conclusive. Thus, the physical sciences possess a primitive fact, in what is called the law of gravity. It was Sir Isaac Newton who first demonstrated, by a happy effort of genius, that all the planets in our system gravitate towards the sun, by the same law, and in consequence of the same principle, as that by which bodies on the earth gravitate towards its centre. This theory was subsequently found applicable to a vast number of circumstances, and by it the philosopher now explains many of the material phenomena of the universe, and the astronomer calculates the movements of the heavenly bodies. This law applies to all the facts of which physical science is made up. In the same manner, chemistry possesses a primitive fact in what is called the law of affinity, discovered later by Lavoisier. If we mix two salts which mutually decompose each other, a third salt is formed by the union in definite proportions of their constituent elements. This, in the language of chemists, is brought about by chemical affinity. Did we repeat the experiment a thousand times, the same result would take place, and the same law which applies in one case, is found universally applicable to every phenomenon in chemical science. The possession of this primitive fact, then, communicates the greatest accuracy and precision to the sciences which possess it, and on this account they are called the *exact* sciences.

But there are other sciences which are altogether destitute of a primitive fact; which consist of groups of phenomena, each of which may or may not be governed by a particular law. Such a one is agriculture. No man, however skilful, can till the ground, or cultivate the soil, and be certain of the same result on every occasion. Numerous circumstances, over which he has no control, may destroy his anticipations and show the fallacy of his calculations, and this, after every known condition has been fulfilled, and every possible degree of prudence and sagacity has been exercised to ensure success. The same means, apparently, which operate at one time fail to do so at another. Such sciences, then, are denominated *inexact* sciences, and it is to this class that medicine belongs.

Now, the cultivators of medicine always have been, and are still endeavouring to render the science *exact*, and hence at various times different individuals have brought forward what they conceived to be a law or primitive fact, and which they have tried to show was applicable to all vital phenomena. Some have placed it in the physical condition of the solids, and others in the physical condition of the fluids. Hence the terms *solidism* and *fluidism*. A third party have sought it in the functional conditions of the body, viz., an alteration in the living force. Hence the term *vitalism*. If, for instance, we could constitute the vital property, excitability, a primitive fact, it would serve the same purpose in physiology that gravitation does in physics. But we cannot do this. It is true that the stomach is excited by the food, in order that digestion may be produced, and that the lungs are excited by the air during the process of aeration. But, in the performance of these functions, excitability plays a secondary part; it is only one of the elements necessary for their completion, and is utterly insufficient to account for their production. In the same manner, the mechanism of the solids or of the fluids cannot explain every known fact; so that it becomes necessary to take all three doctrines, solidism, humoralism, and vitalism, into consideration, if we wish to escape fallacy.

Of late years it has been contended that, as far as structure and development are concerned, we do possess a law in the doctrine of cyto-genesis, that is, of the growth of those minute vesicles or cells, of which we find all plants and animals, at one period of their existence, to be composed. It has been argued that if a theory of organization can be shown to apply to all animated nature; to the vegetable as well as animal kingdom; if it can be demonstrated that the humblest and minutest tribes of plants possess the same original structure as is to be found in the most gigantic trees of the forest; if it become evident that the same principle of formation is discoverable in animals, whether so minute that thousands may be contained in a drop of water, or, on the other hand, in animals so enormous as the elephant or whale; nay, more, if it admit of demonstration, that the organic diseases to which they are subject, that the formation of new growths, and the reparation of tissues, are explicable by the same theory as applies to the development of healthy structure, surely, it is contended, we are approaching to something like a great primitive fact which may ultimately communicate exactitude to physiological science. And yet, notwithstanding the flood of light which has been thrown upon all departments of our science by the beautiful generalization of Schleiden and Schwann, recent researches have exhibited its insufficiency to explain all known phenomena of growth.

Medicine, then, in its present state, possesses *no* primitive fact. But is it not very possible that it may do so at some future time? During the many ages that existed before Newton, physical science was as inexact as that of physiology is now. Before the time of Lavoisier, chemistry, like physiology, consisted of nothing but groups of phenomena. These sciences went on gradually advancing, however, and accumulating facts, until at length philosophers were found who united these together under one law. So medicine, we trust, is destined to advance, and one day another Newton, another Lavoisier, may arise, whose genius will furnish *our* science with *its* primitive fact, and stamp upon it the character of precision and exactitude.

Although it must be confessed that we have not yet arrived at such a happy consummation, it cannot be denied that we are making rapid strides towards it. Notwithstanding those principles which Bacon introduced into the study of science, it is only lately, from the advance of collateral branches of knowledge, that we have been enabled to catch glimpses of a correct philosophy as applied to physiology. A truly scientific medicine is yet to be created—for all the processes of life, both in its healthy and diseased conditions, are really owing to the structures which have been only lately made visible by the improvement in optical instruments. We know also, that these processes are connected with physical and chemical changes, the importance of which we are just commencing to estimate. But now, assured of what is really necessary, and guided by rigid observation and experiment, rather than by a vague hypothesis, physiology and pathology are advancing with such rapidity, that every year revolutionizes the ideas which sprang up in the one which preceded it. Moreover, it has been satisfactorily shown, that the branch of science which refers to vital phenomena, bears such a relation or correlation to various branches of *physical* science, that the whole is gradually becoming more simple, instead of more complex. Instead of physiology being isolated under the idea that its laws are peculiar, it is every day becoming more evident, that vegetable and animal life are dependent on conditions which, strictly speaking, are elucidated by the geologist, botanist, zoologist, chemist, and natural philosopher. In short, the union of the natural sciences seems to be near at hand.

But you do not cultivate these sciences as barren though interesting subjects of medical study. With you, I apprehend, as with myself, the knowledge so acquired constitutes a groundwork for the practice of an art. It is in this point of view I am especially anxious you should consider physiology and pathology. For, gentlemen, I trust that, in studying these, or any other subjects, you will never lose sight of the important fact, that you are medical students, and that as such, your ultimate object is to acquire an art, in other words, a knowledge of all those means which are directed to the prolongation of life and the cure of diseases. Now, in order that you may successfully accomplish this great object, it is necessary that you should appreciate properly the importance of theory in its bearings on practice, so that when you are called upon to treat the sick, you may be ready to take advantage of all the knowledge which you may have obtained. Hence the importance of knowing how to distinguish between the nature and object of science and art respectively.

We may consider science, then, to be a collection of theories; art, a body of rules. Science says, this is or is not; this is probable or improbable. Art says, do this, avoid that. The object of science is to discover facts and determine laws; the object of art is to accomplish an end, and determine the means of effecting it. Science is inductive, and reasons; art is imitative, and exemplifies. Science is steady, certain, and progressive; art is vacillating, doubtful, and limited.

Hitherto it has been imagined that the chief, if not the only method of obtaining skill in art, is by practising it; that is, obtaining experience. In medicine this is proverbial, and every practitioner is more apt to boast of his experience than of his knowledge. In the infancy of science, indeed, we can readily understand that its hasty generalizations must have been continually overthrown and rendered ridiculous the moment they were applied to practice. Hence the reason why art for many ages preceded science—why dogmatic rules were more attended to than ingenious theories—and why the accomplishment of an end, even when that end was limited, was more regarded than the discovery of a new fact, or the determination of a law capable of extensive application. But, in recent times, this state of things is gradually becoming reversed. Science, in numberless instances, has advanced beyond art; nay more, science herself has worked out all the details, and made art obedient to her commands. Thus it was that the theory of achromatism, worked out by Euler, led opticians to make perfect telescopes and microscopes. Thus it was that Le Verrier and Adams, by calculations in their observatories in Paris and London, discovered a planet which they had never seen, but which, when looked for, according to their directions, from Stockholm and St. Petersburg, was immediately proved to exist in fact, as it had previously been proved to exist in theory. Thus it was that the electric telegraph, perfected in the closet of the man of science, flashed ready made on the astonished gaze of an admiring world; and thus it is that at the present moment we see the artizan in his workshop, the explorer in the mine, the agriculturist in his farm, nay, even the sculptor in his studio, abandoning the rules and wise saws handed down to him from ancient tradition, and accommodating himself to the revolutions which science has dictated, and those laws whereby blind experience is made to yield to an enlightened knowledge.

We may, therefore, receive, as an established law, the statement, that the more any particular science is advanced, the more is the art to which it leads rendered perfect, and that the true theory of the one produces never-failing rules in the other. The art of navigation, for instance, is certain, because the science of astronomy on which it is based, admits of exact calculation. In like manner, the only way of improving the art of medicine is to advance the science of physiology, and all that has been accomplished during the last fifty years has been brought about in this manner. In that short time have been discovered the independent properties of the nerves, the reflex functions of the nervous centres, the chemical balance of organic nature, the functions of cells, and their influence on nutrition and secretion, the laws regulating the development of the ovum, the significance of the sounds produced by the heart and lungs, and numerous other doctrines, which have tended to improve the art of medicine.

But while the modern cultivator of medicine loses no opportunity, and employs all the means which the improved state of science furnishes him with, for investigating the morbid anatomy and causes of disease, he ought to correct the theoretical conclusions to which these alone might lead him, by practical experience and observation. Our active and our speculative powers should go hand in hand, so that, by a union of theoretical knowledge and practical skill, we may advance both to their farthest limits. It is by cultivating medicine in this spirit that the clinical school of Edinburgh has rendered itself so famous. Those who taught the theoretical branches of medicine from their chairs in the University, were those who taught the practice in the wards of this Infirmary. They were thus enabled to demonstrate how, on the one hand, correct observation led them to just deduction, and on the other, how a knowledge of general principles caused them to be more accurate and acute in observation. Indeed, it is impossible to estimate too highly the advantages which have resulted from such a system, as it has been carried on uninterruptedly by the Professors of this University, for one hundred and ten years. This leads me to speak of

The Mode of Conducting the Clinical Course.

Your principal object, gentlemen, in coming here, is, I presume, to observe disease for yourselves. To observe with advantage, two things are necessary: 1st, The correct appreciation of actual facts, as communicated to the senses of the practitioner or of his patient; 2d, Deducing from these a correct judgment as to the nature of the disease, and the proper mode of treatment. Both these processes are very difficult, and some men have a natural aptitude for the one, and some for the other. They are also frequently confounded together, some observers considering to be facts what are only theories, and others imagining that to be theoretical which is truly fact. Thus the assertion that a man is labouring under apoplexy, pneumonia, pericarditis, and so on, is only stating the opinion or theory the practitioner holds with regard to his case, although such assertion is generally received as a fact. Again, when it is said that porrigo favosa consists of vegetable fungi, growing on the scalp, the statement, though generally received as mere theory, is truly a fact, inasmuch as the vegetations may actually be demonstrated, and rendered as visible to the eye as trees growing in a plantation. Indeed, the just distinction between theory and fact is a matter which has excited lively discussion, and hence the celebrated saying of Cullen, that there are more false facts then false theories in medicine.

If, in medical observation, we define a fact to be anything which is obvious to the well-cultivated senses of the observer, we perhaps approach as near accuracy as is possible. Remark, I say *well cultivated*, because the senses require to be educated before they can receive proper impressions. In this lies the great difficulty in teaching practical medicine, for what is obvious to the sight of an experienced practitioner is overlooked by the student; the sound which is heard by the one is inaudible to the other; what the first feels distinctly is not perceived by the second. Now this instruction of the senses constitutes a kind of information which cannot be obtained from others; you must acquire it for yourselves. Of late years, however, the detection of facts has been greatly facilitated by the appropriate use of instruments, whereby what at one time was conjectural is now rendered certain. Thus, the existence of many diseases, which could formerly be arrived at only by a happy speculation, or by a rare sagacity, is easily demonstrated by those who know how to employ, judiciously, chemical tests, microscopes, stethoscopes, pleximeters, specula, etc. To carry observation, then, to its utmost extent, we must learn how to avail ourselves of all these means in the examination of the signs and symptoms of disease.

On the other hand, gentlemen, a sound and correct judgment is equally necessary, in order that the cultivation of the senses may lead to a proper end, and indicate the direction in which you must act for the benefit of the patient. For this purpose a certain degree of preliminary instruction is absolutely essential before you can be qualified to attend an hospital with advantage. Indeed, I must take it for granted, that before coming here you are tolerably well acquainted with anatomy and chemistry; that you have studied the institutes of medicine, that is, the present state of histology, physiology, and pathology, and that you have a knowledge of the materia medica, and of the effects of remedies on the economy. Thus prepared, you commence a series of visits to the bedsides of those who are labouring under disease, in other words, you enter upon a course of clinical instruction. What should we understand by clinical instruction? It is not attendance on the lectures only—it is not merely learning the opinions of your teacher—in short, it is not simply deriving knowledge from others. It is acquiring medical information for yourselves—it is the learning how to observe—it is that education of the senses to which I have alluded; and, in addition, the formation of that sound judgment which will enable you to act for the benefit of your patients. This can only be learned by continual practice and experience; and it has always appeared to me that the great aim of clinical instruction should be to enable the student to acquire that kind of tact and readiness *to do*, which we have seen constitutes art.

How are all arts acquired? A young mechanic, when he makes a chair, follows exactly the same process as those who study what are called the fine arts. That is, he learns how to do what his master does before him. He imitates his plan of proceeding. His first attempts are rude and uncouth; his subsequent ones are more perfect, until, at length, by continual practice, he is enabled to equal, or surpass, his instructor. In painting, sculpture, and music, there are principles which must be attended to, and which are learnt from others; but no man can become a painter, a sculptor, or a musician, without obtaining practical skill as an artist, in the way now alluded to. It is thus, and thus only, that art descends from the old to the young. And so in medicine; it is not enough to obtain general views of health and disease, or to study what is known of the nature and treatment of individual maladies. It is absolutely essential to watch diseases for yourselves, to see the altered countenance and form, to feel the variations in the pulse and temperature of the surface, to hear the changes which the sounds of the heart and lungs undergo, to learn the employment of stethoscopes, microscopes, and other mechanical aids in investigation, and to adapt those remedies which are in use, to the special case before you. It is only by a combination of such training in a hospital for the sick, with the varied scientific knowledge you have obtained elsewhere, that you can hope to prepare yourselves conscientiously for the responsible duties of a medical practitioner.

Considering, then, that a too exclusive attention either to theory or practice, tends to circumscribe the usefulness of the physician, it will be my endeavour to afford you every facility for learning medicine both as a science and as an art. For this purpose the course will consist of two kinds of instruction. 1st, Lectures; 2d, The examination of, and the prescribing for, the patients by the student. In the lecture I shall direct your attention to the histories of the cases we have previously examined, notice the difficulties in diagnosis, or the peculiarities they may have presented—speak of the treatment which has been employed, or of the recorded experience of those who are acknowledged to be worthy guides for our imitation—and especially dwell upon such points of doctrine or speculation as may be serviceable to us in our efforts at cure. At the bedside I shall call upon such of you as wish to exercise yourselves in observation, to examine the patient, according to a plan which I shall subsequently communicate to you: then, having elicited the facts, to form a judgment as to the nature of the case; and lastly, to suggest a plan of treatment, and prescribe for the patient. In doing this, numerous opportunities will present themselves for the communication of practical instruction in the use of various instruments, for improving the observing and reflecting powers, and for obtaining a familiarity with the method of combining medicines in extempore prescriptions.

This plan of clinical instruction has been for a long time practised on the Continent, and especially in Germany. It was also followed by Dr. Graves, in Dublin. I have myself taught in this way for the last sixteen years, to classes at the Royal Dispensary, and in this Infirmary. I have never found that it produced the smallest inconvenience to teacher, student, or patient, or was open to the slightest objection; but, on the contrary, that it has been productive of good to all parties.

It has given me much pleasure to observe the readiness with which the students, during the last ten years, have entered into this plan, and the evident advantage they derived from it.

I am satisfied that you will not cultivate practical medicine very long in this way without noticing a fact, which is every year becoming more and more evident, viz.—that the art has of late years been undergoing a great revolution. It is daily becoming apparent to those who observe in a spirit of sincerity and of truth, that much of the practice of our profession, which has resulted from what is called experience, is altogether incompatible with the existing state of our knowledge—that in consequence it requires a thorough revision—that the systems and nosologies of our forefathers, though useful in their day, no longer apply—and that a new field of labour is now open to the cultivation of those zealous clinical students, who are anxious to identify themselves with the progress of medicine.

It cannot fail to strike all those who have paid any attention to modern medical education, that whilst physiology and pathology have been making rapid advances, our previous impressions of the action of drugs, and of various modes of treatment, have become altogether changed. Whilst we were ignorant of the structure and functions of an organ or tissue—so long as we confounded together causes and results—so long we were especially apt to be led astray by tentative efforts at cure. But once establish on indisputable data what is really fact—what is the true law governing the progress of a disease—and in how many instances does it then become evident that the means employed for its removal are feeble or altogether inert. This has now occurred so extensively—systematic works on medicine are so at variance with books on physiology and pathology—the practice of the profession is so discordant with its theory—that many intellectual inquirers among us take refuge in a universal scepticism as to the action of drugs, leave everything to nature, and merely adopt what is called in France an expectant treatment, and in Germany the practice of "Nihilismus." Nay, it has been even contended that our remedies, so far from doing good, in many instances do positive injury, and that it is safer to trust to nature than to the physician.

The only method of escape from this state of things, it appears to me, is by an earnest effort on the part of those who sincerely desire the improvement of our art, to establish the science of medicine upon something like a solid foundation. Let us, at all events, endeavour to realise our position, and to separate what is known from what is unknown. Among the known, let us determine what we have derived from scientific generalization, and what from blind experience ; and in the vast field of the unknown, let us, if possible, agree as to the direction and manner in which we ought to work, in order to explore its extent, and contract its boundaries.

The propriety of this procedure is admitted. Why, then, is it not carried out? — why cannot we co-operate in the resolve to prosecute our noble profession with a simple desire to advance it towards its true end—the cure of disease? What are the circumstances which, at the outset of every honest attempt, discourage our endeavours to improve medical practice? They seem to me to be connected, as far as this country is concerned—1st, With the political; 2d, With the social; and, 3d, With the practical departments of our profession. On each of these subjects a volume might be written, but I shall endeavour to place their leading aspects before you in a few words.

The Political State of the Medical Profession.

When we regard all the other professions and pursuits of life in this great country, we find there are none of them, except medicine, which are excluded from the high offices of state, or forbidden to aspire to any rank below that of royalty. The eminent lawyer or divine—the successful admiral or general—the popular author—or the heads of our great commercial houses, may become peers of the realm, are commonly seen taking an active part in the Legislature, and frequently receive reward or distinction conferred upon them, by a nation grateful for their services. It is a fact well calculated to excite astonishment, that a class of men who have dedicated themselves to the well being of the public health, should be comparatively neglected. In this respect, we suffer with men of science in general, who, however much they may be respected individually, are but slightly encouraged by the state. The hackneyed phrase of our legislators with regard to all men of science, including medical men, is, in the words of Sir Robert Peel, that "science is its own reward;" or in the words of the Duke of Argyle, "that in the main it must depend for its advancement on its own inexhaustible attractions, and on the delight which it affords us to study the constitution of the world around us." But in every civilized country except Great Britain, it has been thought a matter of good policy to encourage, by marks of honour, those who, by their scientific labours, have contributed to the public weal. The French reproach the profession in this country for having achieved for itself no adequate honour or reputation. It has been said that "in France, during the last half century, there is no council-board, no administration, no society, in which the medical profession has not found itself represented, whether at the court of the sovereign, or among the peerage, or in the legislature. Physicians of the Institute take their place naturally among the first of the land. Their views, their discoveries, their cures, their professional ideas and suggestions, must be listened to, cannot be neglected, and may never be treated as intrusion; nor had Napoleon fewer physicians and surgeons for friends, councillors, and dignitaries of state, than he had of any other profession. But in

England, all such interests find themselves either misrepresented, or not represented worthily; and the best of their physicians is good only to amass money, or at the highest, get a baronetcy."—(*Examiner.*)

All this, gentlemen, would be of little importance, did it not, as I shall point out immediately, greatly affect our social position, and through it lower the true objects for which medicine ought to be cultivated.

Much of the evil arises from the fact, that the medical profession in this country possesses no national organization. Unlike the other professions, so far from there being a bond of union among its members, they are irreconcileably divided by the chartered medical institutions. These amount to about thirty in number, with different powers conferred upon them by past sovereigns or governments, and each having an interest in aggrandising itself at the expense of its neighbours. These various institutions, though they were all established professedly to support the honour and dignity of medicine and its cultivators, are so discrepant in power, and so conflicting in interest, that they have led to little but confusion and disunion among the members of the profession at large.

Such, of late years, have been the clashing interests, the conflicting privileges, the injury inflicted on the student, and on medical education, the discreditable prosecutions in our courts of law of well-educated medical men, whilst the ignorant pretender is allowed to escape, and a host of other evils, that a universal cry has been raised for what is called medical reform—that is, a re-arrangement of the affairs of the profession, by an act of the legislature. It would be curious to analyse the different measures which have been proposed for this purpose. But it was to be anticipated that our medical corporations would look after their own interests—oppose everything that encroached upon them—and in cases where there existed few or no privileges, that efforts would not be wanting to obtain them, even at the expense of sister institutions. The endeavours of the profession, during the last twenty years, on this subject, have ended in nothing, nay, worse than nothing, as they have engendered every species of rancour and jealousy among parties who ought to have been united, in order to attain the object sought.

The course which government has taken with regard to this matter seems very injudicious—"Agree," it says, "among yourselves, as to a measure of medical reform, and we will give it consideration." But this agreement is as improbable as would be the union of the most opposing elements. What we require is, a statesman, who, after mastering the subject, will cause a bill to be passed, which shall secure equality of education and of privilege throughout the whole empire, with a marked protection and encouragement for the educated, as distinguished from the uneducated, in practice. The means for accomplishing this end must be settled by the legislature, as it is evident the medical corporations will never agree as to details.

The Social State of the Medical Profession.

The evils resulting from the political condition of the medical profession, have led to still greater ones in its social state. In consequence of the complete absence of public positions, with emoluments sufficient to satisfy the reasonable desire and ambition of scientific men—as the most skilful physician, or most successful discoverer, does not, in consequence, receive any dignity or honour from the state—and as the offices of our medical corporations, as they are at present managed, are utterly incapable of supplying the deficiency—it follows that the only prize open to the aspiring and ambitious is the wealth to be derived from an enormous practice.

If, indeed, there was any necessary relation between the popularity of a physician and his real professional merit, we might recognise this as, so far, a reward and encouragement. But it is notorious that this is not the case, and that in many instances large practices are acquired by the most unblushing charlatanism. St. John Long was supposed to have received about twelve thousand pounds a-year for pretending to cure consumption, by rubbing an escharotic liniment into the chest, and when at length he was tried for the manslaughter of Miss Cashin, evidence in his favour was given by half the aristocracy of the metropolis. In all ages, indeed, the successful pretender has succeeded in collecting more gold than could be accomplished by honourable members of the profession; then, however, the imposture was manifest, and carried its own shame with it. But the bane of the profession at this moment is the existence of a class of medical practitioners, who, in arduous competition with their fellows, and pressed, perhaps, by the necessity, if not the desire of making money, have come to the conclusion, that what they really know and can perform professionally is of much less consequence than what the public gives them credit for. The ultimate influence of this state of things, on their own morals, and on the welfare of the profession, must be obvious.

But let us suppose that a really able man, after years of toil and anxiety, at length reaches the full career of a metropolitan practice. Is this, after all, a suitable reward for his labours? Is this position really a desirable one, with regard to its results either on his own mind or on the honour and higher interests of his profession? On this head I prefer reading the statement of another. "Many years attention to all subjects affecting the profession of physic," says an anonymous writer, "has led us to the conclusion that large practices, the only prizes which the profession offers at present to its members, are in many ways its bane. By them the high scientific tone of the profession is depressed; its independence sunk; a low standard of effort is fostered; the individual who succeeds is rendered worthless; the public cheated; false practice authorised; quackery promoted; and sterling merit often deprived of its just reward."*

* Azygos on Medical Reform, London, 1853—who will see that I have adopted some of his arguments and a little of his phraseology.

Occasionally, also, this excessive practice leads to such a love of money, or desire to be thought important, distinguished, or influential, that in order to obtain it the proper etiquette of the profession is abandoned, and every feeling of gentlemanly propriety and honour is first blunted, then destroyed. The great position a person of this kind fancies he has attained leads him to neglect the interests and just claims of his fellow-practitioners, and then to snatch from them their patients, who, after all, among the crowd of those he attends, are often sadly neglected.

By watching the progress, and mingling in the society of men of this class, the professional mind is in danger of being rendered unsound, and animated more by a desire of attaining what is conventionally received as "success in life," which simply means the obtaining of a large income, than by the higher incentive of public usefulness.

The Present State of Practical Medicine.

If the political state of the medical profession leads to the deterioration of the social one, so does the latter lead to the greatest confusion in, and distrust of, the power of cure. What, indeed, is to be expected of men whose highest aim and boast are to have a large practice? Are the statements of their wonderful cures, of their practical knowledge, and the success of remedies in *their* hands, and so on, to be trusted?—statements which, for the most part, so far from promoting, tend only to retard and obstruct the advancement of the medical art. On the other hand, those of this class who act conscientiously (and many such, to the honour of medicine exist), are too busy in the active duties of their calling, and have too little time to follow the rapid progress of the science. Hence, what they have acquired by long experience, is seldom seen by them to harmonise (though truth in practice always must in the end harmonise) with truth in theory.

Although seventeen years have elapsed since the cell doctrine of growth has been admitted into physiology and pathology, medical men have not yet realised to themselves its vast importance in a practical point of view. The morbid processes of inflammation, of tuberculization, and of various morbid growths, are now for the most part elucidated by this theory. But a cell pathology is no more universally applicable to the phenomena of disease than is humoralism or solidism. Indeed, we may more correctly speak of a molecular pathology, as a molecule, and not a cell, is the first and last form of organization. What, however, it is important to remember here is, that if there be a molecular or a cell physiology and pathology, so is there a molecular and a cell therapeutics. For, it is evident, that those diseases which depend on an increase or diminution of cells, can only be reached scientifically through a knowledge of those laws which govern their evolution and disintegration.

Thus, growth (that is, the multiplication of cells) is favoured by increased warmth, by room for expansion and by moisture;—and it is checked by cold, by pressure, and by dryness. If then, an exudation be poured out and coagulated near the surface, as it can only disappear by its passing through the stages of cell growth, we favour suppuration, that is, the growth of pus cells, by warm poultices or fomentations, and retard it by cold and pressure.

Pneumonia consists of an exudation into the vesicles and tissues of the lung, which coagulates and excludes the air. It is very doubtful whether a large bleeding from the arm can operate upon the stagnant blood in the inflamed part, or the congested capillaries in its neighbourhood—that it can directly affect the coagulated exudation is impossible. But lowering the strength and vital power of the individual is directly opposed to the necessary vital changes which the exudation must undergo in order to be removed by cell growth and disintegration. Hence it is, in my opinion, that the mortality from pneumonia has diminished since large bleedings have been abandoned, and not because, as has been suggested by an eminent authority, inflammations, like fevers, have changed their types since the days of Cullen and Gregory.

The absorption of a pleuritic effusion depends on the formation of new blood-vessels in the coagulated exudation, which is adherent to the pleuræ. These in their turn are the results of cell formation. Such formation, so far from being encouraged, and an absorbing surface produced from an exhaling one, can only be retarded or prevented by large bleedings and antiphlogistics.

The growth of tumours may be encouraged or retarded by the same means which influence all kinds of cell development. But if they assume a parasitic character, as in cancerous growths, that is, if the cells possess a power of multiplication in themselves, then the only chance of cure is in their complete destruction or extirpation. But the surgeon who trusts to his naked sight, forgets that germs are infiltrated among the surrounding tissues, and are so minute that he cannot see them; yet he employs no microscope to discover them. He cuts out a tumour, but cuts through the disease. Need we wonder, therefore, that it should frequently return, or rather continue to grow, as in fact it has never been removed.

The beneficial changes which have taken place in our treatment of apoplexy, syphilis, small-pox, phthisis, Bright's disease, favus, and many other diseases, might in like manner be shown either to have originated from, or to be capable of being satisfactorily explained by an advanced knowledge of physiology.

Again, notwithstanding the universality with which the stethoscope and auscultation are now received as necessary means of diagnosis, how few of our medical men, comparatively, are really skilful in detecting by them the morbid changes going on in the heart and lungs. The stethoscope, indeed, was as much sneered at when it was first introduced as the microscope is now. Physicians then existed, who taught that a piece of stick was not likely to make us discern much that was going on in the lungs, and who cautioned students against losing their time in learning auscultation, just as some now do in reference to histology. But the philosophic practitioner must see the necessity of using every means in his power for detecting disease, whether stethoscopical, microscopical, or chemical.

I cannot too strongly advise you not to be influenced by the opinion of those who, educated before these means of research came into general use, speak of them as worthless, especially in the investigation and diagnosis of disease. Because, in short, they are ignorant of their value, therefore they hold that they can be of little benefit. I need scarcely remark, that this kind of reasoning is altogether unsound, and is directly opposed to the introduction of all improvement in either science or art. What should we think of a modern astronomer who boasted that it was enough for him to examine the heavens with his naked eye, and sneered at telescopes? or how should we like to trust ourselves at sea to the navigator who, as in ancient times, steered his course by the sun and stars, and who abused sextants and other instruments whereby alone exact results are arrived at? Such, however, is precisely the position of those medical men who underrate stethoscopes and microscopes, and thus betray an unacquaintance with the present state of their own art.

At all events, in this Clinic, you will find that we seize eagerly on every means that science places in our hands, for detecting the true nature of disease—that percussion, auscultation, histology, and chemistry, will all be pressed into our service—that, whilst we spare no pains to make ourselves masters of observation, cultivate our senses to the utmost, study symptoms, and thus endeavour to unite the knowledge of the present day with the experience of the past—we shall never forget that the Medical Art is founded on science, the only guarantee of its elevated and ennobling character, and the only secure means for its future advancement.

What, then, is required, in the present condition of medicine, is an attempt to bring our advanced knowledge of physiology and pathology to bear upon the treatment of disease, and by renewed observation, with all the aids that modern diagnosis gives us, to reinvestigate the action of our more important remedies. In so doing we should not neglect past experience, but endeavour to make the truths it has taught us harmonise with scientific laws.

So far from believing in the propriety of a pure expectant system, or a "Nihilismus," I am convinced that experience has furnished us with some most precious results. No one can doubt, for instance, that quinine cures ague, and that lemon-juice cures scurvy. Why they do so we are ignorant, and hence those remedies are given empirically—that is, as a result of blind experience. It has also been distinctly shown that sulphur ointment cures scabies. But here, I think, false reasoning has stepped in, and declared sulphur to be as much a specific for scabies as quinine is for ague. But scabies depends upon the presence of insects which lay their eggs in the skin; and the greasy matter of the ointment is brought, by means of friction, into contact with, and asphyxiates them, just as well without as with sulphur. But to discover these insects, and to determine their habits, patient and long continued scientific research was necessary, and practice now reaps the benefit of it.

It is true that the contradictory opinions concerning medical doctrine and practice have, in all times, excited the ridicule of the weak-minded, and still constitute the ground on which Medicine is attacked by the ignorant and superficial. Yet the differences which exist, no more prove that there is no foundation for Medicine as a science, than the varieties of religious sects show that there is no truth in religion, or than the opposing decisions of our courts of law prove jurisprudence to be a farce. All these contradictions depend upon imperfect attempts at correct theory; and this latter once rendered perfect, it will be seen that both health and disease are governed by laws as determinate as the motion of the planets and the currents of the ocean.

But notwithstanding the discouragements which knowledge has received and will ever suffer from the indolent or narrow-minded, at no period has the tendency to cultivate scientific medicine been more strongly manifested than it is at this moment. Everywhere in Europe do we observe a noble effort to enlarge the foundations on which its practice is based. Everywhere we see Natural Philosophy advancing —enthusiastic chemists pushing forward organic analyses—anatomists, unwearied in their researches concerning development and the structure of tissues—physiologists experimenting and concentrating all the resources of modern science in order to elucidate organic laws—and pathologists busy in connecting the symptoms observed in the living, with alterations in the minutest tissues and atoms of the dead. At this time Medicine is undergoing a great revolution, and to you, gentlemen, to the rising generation, do we look, as to the agents who will accomplish it. Amidst the wreck of ancient systems, and the approaching downfall of empirical practice, you will, I trust, adhere to that plan of medical education which is based on Anatomy and Physiology. If you resolve to follow in the legitimate path of improvement to which all reason and experience invite you, be assured that the toil of mastering what is now known of correct generalization, will not be in vain. Everything promises, that before long, a law of true harmony will be formed out of the discordant materials which surround us; and if *we*, your predecessors, have failed, to *you*, I trust, will belong the honour of building up a system of Medicine which, from its consistency, simplicity, and truth, may at the same time, attract the confidence of the public, and command the respect of the scientific world.

SECTION I.

EXAMINATION OF THE PATIENT.

It is absolutely necessary that an examination of patients at the bedside should be conducted with order, and according to a well understood plan. I have observed that some students, on being called upon, in their turn, to interrogate a case, have felt great embarrassment, and have been unable to proceed. Others have put their questions, as it were at random, without any apparent object, and wandered from one system of the economy to another, in a vain search for a precise diagnosis, and a rational indication of cure. But continual practice, and the adoption of a certain method, will remove all difficulty. No doubt, the questioning a patient, to arrive at a knowledge of his condition, requires as much skill in the medical practitioner, as examining a witness does in counsel at the bar. They make it an especial study, and you must do so likewise. You should remember that, in proportion as this duty is performed well or ill, is the probability that your opinion of the case may be correct or incorrect; and that, not only will the reputation you hold among your colleagues greatly depend on your ability in this matter, but that the public itself will promptly give its confidence to him whose interrogations reveal sagacity and talent.

The method of examination differs greatly among practitioners, and must necessarily vary in particular cases. Men of experience gradually form a certain plan of their own, which enables them to arrive at their object more rapidly and securely than that adopted with, perhaps, an equally good result by another. In a clinical class, however, and in order that every one present may follow and understand what is going forward, the method adopted must be uniform. I hold it to be a matter of great importance, that every one standing round the bed should take an equal interest in what is proceeding, and this he cannot do unless he is fully aware of the manner and object of the examination. The plan which appears to me the best, and which we shall follow, is the one I learnt when myself a clinical student in the wards of Professor Rostan, of Paris. Its object is to arrive, as quickly as possible, at a knowledge of the existing condition of the patient, in a way that will insure the examiner that no important organ has been overlooked or escaped notice.

For this purpose, we ascertain, in the first instance, the organ principally affected, and the duration of the disease, by asking two questions, "Where do you feel pain?" and, "How long have you been ill?" Let us suppose that the patient feels pain in the cardiac region, we immediately proceed to examine the heart functionally and physically, and then the circulatory system generally. We next proceed to those organs which usually bear the nearest relation to the one principally affected—say, the respiratory system—and we then examine the lungs functionally and physically. We subsequently interrogate the nervous, digestive, genito-urinary, and integumentary systems. It is a matter of little importance in what order these are examined—the chief point is, not to neglect any of them. Lastly, we inquire into the past history of the case, when we shall have arrived at all the information necessary for the formation of a diagnosis.

The following is the arrangement of symptoms and circumstances demanding attention under each of the seven heads into which the examination is divided:—

I. Circulatory System.—*Heart*—Uneasiness or pain; its action and rhythm; situation where the apex beats; extent of dulness determined by percussion; its impulse; murmurs—if abnormal, their character, and the position and direction in which they are heard loudest. *Arterial pulse*—Number of beats in a minute; large or small, strong or feeble, hard or soft, equal or unequal, regular or irregular, intermittent, confused, imperceptible, etc. If an aneurismal swelling exist, its situation, pulsations, symptoms, extent, and sounds, must be carefully examined. *Venous pulse*—If perceptible, observe position, force, etc.

II. Respiratory System.—*Nares*—Discharges; sneezing. *Larynx and Trachea*—Voice, natural or altered in quality, hoarse, difficulty of speech, aphonia, etc.; if affected, observe condition of epiglottis, tonsils, and pharynx, by means of a spatula. *Lungs*—State of respiration; easy or difficult, quick or slow, equal or unequal, laboured, painful, spasmodic, dyspnœa, etc.; odour of breath. Expectoration, trifling or profuse, easy or difficult; its character, thin or inspissated, frothy, mucous, purulent or muco-purulent, rusty, bloody; microscopical examination. Hemoptysis, colour, appearance and amount of blood discharged. Cough, rare or frequent, short or long, painful or not, moist or dry. External form of the chest, unusually rounded or flattened, symmetrical or not, etc. Movements—regular, equal, their amount, etc. Resonance, as determined by percussion, increased or diminished, dulness, cracked-pot sound, etc. Sounds determined by auscultation, if abnormal, their character and position.

III. Nervous System.—*Brain*—Intelligence—augmented, perverted, or diminished; cephalalgia; hallucinations; delirium, stupidity, monomania, idiocy; sleep, dreams, vertigo, stupor, coma. *Spinal cord and nerves*—Pain in back; general sensibility, increased, diminished, or absent; special sensibility—sight, hearing, smell, taste, touch, their increase, perversion, or diminution; spinal irritation, as determined by percussion; motion, natural or perverted, fatigue, pain on movement; trembling, convulsions, contractions, rigidity, paralysis.

IV. DIGESTIVE SYSTEM.—*Mouth*—Lips, teeth, and gums; taste in the mouth. *Tongue*—Mode of protrusion, colour, furred, coated, fissured, condition of papillæ, moist or dry. *Fauces, tonsils, pharynx and œsophagus*—Deglutition—if impeded, examine the pharynx with a spatula, the cervical glands, neck, etc.; regurgitation. *Stomach*—Appetite, thirst, epigastric uneasiness or pain, swelling, nausea, vomiting, character of matters vomited, flatulence, eructations. *Abdomen*—Its measurement and palpation; pain, distension or collapse, borborygmi, tumours, constipation, diarrhœa, character of dejections, hemorrhoids. *Liver*—Size, as determined by percussion, pain, jaundice, results of palpation, etc. *Spleen*—Size, as determined by percussion. If enlarged, examine blood microscopically.

V. GENITO-URINARY SYSTEM.—*Uterus*—Condition of menstrual discharge, amenorrhœa, dysmenorrhœa, menorrhagia, leucorrhœa, etc. If pain, or much leucorrhœal discharge, examine os uteri and vagina with speculum; uterine or ovarian tumours; pain in back; difficulty in walking, or in defæcation; functions of mammæ. *Kidney*—Lumbar pain; micturition; quantity and quality of urine, colour, specific gravity; precipitates, as determined by the microscope, and by chemical tests; action of heat; nitric acid, etc.; action on test papers; stricture; discharges from urethra; spermatorhœa, etc.

VI. INTEGUMENTARY SYSTEM.—General posture; external surface; expression of countenance; obesity; emaciation; colour; rough or smooth; dry or moist; perspiration; marks or cicatrices; eruptions (see diagnosis of skin diseases); temperature; morbid growths or swelling; anasarca; œdema; emphysema; etc.

VII. ANTECEDENT HISTORY.—Age; parentage; constitution; hereditary disposition; trade or profession; place of residence; mode of living as regards food and drink; habits; epidemics and endemics; contagion and infection; exposure to heat, cold, or moisture; irregularities in diet; excesses of any kind; fatigue; commencement and progress of the disease; date of rigor or seizure; mode of invasion; previous treatment; in female cases whether married or single—have had children and miscarriages, previous diseases, etc.

Such are the principal points to which your attention should be directed during the examination of a case. A little practice will soon impress them on your memory, and in this manner habit will insure you that no very important circumstance has been overlooked. At first, indeed, it may appear to you that such a minute examination is unnecessary; but we shall have abundant opportunities of proving that, whilst a little extra trouble never does harm, ignorance of a fact frequently leads to error. It is surprising, also, how rapidly one thoroughly conversant with the plan, is able to examine a patient so as to satisfy himself that all the organs and functions have been carefully interrogated. Remember that the importance of particular symptoms is not known to the patient, and that, consequently, it is not in his power voluntarily to inform you of the necessary particulars. It is always your duty to discover them.

In carrying out the examination, the following hints may be attended to:—

1. It should never be forgotten that you are examining a fellow-creature, who possesses the same sensitiveness to pain, and the same feelings as you do, and that everything that can increase the one or wound the other should be most carefully avoided. Prudence, kindness, and delicacy, are especially enjoined upon those who treat the sick.

2. The questions should be precise, simple, and readily comprehended. When an individual has a limited intelligence, or is accustomed to a particular dialect, you will not arrive at your object by becoming impatient, or talking in a loud voice, but by putting your interrogations in a clear manner, and in language proportioned to the intelligence of the individual.

3. It is often necessary, after asking the first question, "Where do you feel pain?" to tell the patient to put his or her hand on the part. An Irish peasant applies the term "heart" to an indefinite region, extending over great part of the chest and abdomen; and a woman, in speaking of pain in the stomach, often means the lower part of the abdomen.

4. When pain is referred to any circumscribed part of the surface, the place should always be examined by palpation, and, if possible, seen. Rostan relates very instructive cases where the omission of one or the other of these rules has led to curious errors in diagnosis.

5. Although the question, "How long have you been ill?" is sufficiently plain, it is often difficult to determine the period of commencement of many diseases. In acute inflammatory or febrile disorders, we generally count from the first rigor. In chronic affections, a lengthened cross-examination is frequently necessary to arrive at the truth.

6. A state of fever may be said to exist when we find the pulse accelerated, the skin hot, the tongue furred, unusual thirst, and headache. These symptoms are commonly preceded by a period of indisposition, varying in duration, and ushered in by a rigor or sensation of cold. Such a febrile state may be idiopathic, when the case is

called one of fever, or symptomatic of some local disease, when the nature of the case is determined by the organ affected and lesion present.

7. In endeavouring to ascertain the cause of the disease, great tact and skill in examination are necessary. We must guard ourselves against the preconceived views of the patient on the one hand, and be alive to the possibility of imposition on the other. Sometimes, with all our endeavours, no appreciable cause can be discovered; and at others we find a variety of circumstances, any one of which would be sufficient to occasion the malady.

8. In forming our diagnosis—that is, in framing a theory deduced from the facts elicited by examination—we should be guided by *all* the circumstances of the case, and be very careful that these are fully known before we hazard an opinion. Even then it is not always possible to come to a satisfactory conclusion, and in such cases the diagnosis should be deferred until further observation has thrown new light upon the nature of the disease.

9. In recording a case, it is, for the most part, only necessary to put down, under each head, the symptoms or signs present. If any system be quite healthy, it should be said that it is normal. In many cases, however, it is necessary to state what are called negative symptoms. This demands great tact, and exhibits a high degree of medical information. For instance, an attack of epilepsy generally commences with a cry or scream; but sometimes there is none—when this should be stated. Again, no expectoration is a rare negative symptom in pneumonia. Symptoms which are usually present in the disease, but are absent in the particular case, constitute negative symptoms.

10. All mention of size should be, according to its exact measurement, in feet and inches. Situation is often referred to certain regions, into which the surface has been arbitrarily divided, such as subscapular, cardiac, epigastric, etc., but it is always better to refer at once to anatomical parts, such as the clavicle, particular rib, nipple, umbilicus, angle of scapula, and so on. Extent should also be determined by proximity to well-known fixed points. All vague statements, such as large, great, small, little, etc., should be carefully avoided; and in recording cases, dates and references should always be given in the day of the month or of the disease, and not in the day of the week.

11. In conversing on, or discussing, the circumstances of the case at the bed-side, we should always use technical language. Thus instead of saying, a man has a cavern at the top of the lung, we should speak of a vomica under the clavicle; instead of saying, a man has diseased heart, we should speak of cardiac hypertrophy, or of insufficiency of the mitral or aortic valves, etc.

Having formed a diagnosis, and prescribed for the patient, the further examination should be conducted at intervals, varying, as regards time, according to the gravity of the case. In addition to the changes which may occur in the signs and symptoms previously noticed, the effects of remedies should be carefully inquired into, and care taken to ascertain whether the medicine and diet ordered have been administered. If the case prove fatal, the symptoms ushering in death, and the manner in which it occurs should be especially observed. Whenever a record of the case is to be kept, I cannot too strongly impress upon you the importance of noting these down in a book at the time, rather than trusting to the memory.* For a long series of years the reports of cases, dictated aloud by the professor, and written down at the bed-side by the clerk, has formed a leading feature of the Edinburgh system of clinical instruction, and constitutes the only trustworthy method of drawing up cases with accuracy.

When a patient dies, the examination is not completed. The time has now arrived when an inspection of the dead body confirms or nullifies the diagnosis of the observer. You should consider this as a most important part of the clinical course. It is invariably regarded with the greatest interest by those who practise their profession with skill. It is only in this manner that any errors they may have committed can be corrected; that the value of physical diagnosis can be demonstrated and properly appreciated, and the true nature or pathology of diseases, and the mode of treating them rationally, can ever be discovered.

But here, again, method and order are as necessary in the examination of the dead as of the living, and it is of equal importance that no viscus be overlooked. The three great cavities should always be investigated. Nothing is more injurious to the scientific progress of medicine than the habit of inspecting only one of them, to satisfy the curiosity of the practitioner, or to determine his doubts on this or that point. Many medical men direct their attention to a certain class of diseases, and are apt to attribute too much importance to a particular lesion. It has frequently happened to me, when pathologist to this institution, to observe, that after the physician has examined this or that organ, to which he has attributed the death of his patient, and left the theatre, that further examination, according to the routine I always practised, has revealed important lesions that were never suspected. Thus, a person supposed to die of Bright's disease of the kidney, may have a pneumonia that was latent and overlooked. Large caverns and tubercular deposits in the lungs may satisfy the physician, and he may leave the body, when intense peritonitis may be subsequently found, arising from intestinal perforation. A man has hypertrophy, with valvular disease of the heart; he dies suddenly, and everything is referred to the cardiac lesion. On opening the head, an apoplectic extravasation or yellow softening may be discovered. I cannot too strongly, therefore, impress upon you the necessity of always making a thorough *post-mortem* examination, and for this purpose you should, if possible, obtain permission to inspect the body, and not any particular cavity.

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* I have arranged a note-book for taking cases, according to the system of examination here recommended, which may be procured of Mr. Thinn, medical bookseller, close to the Infirmary.

The object of a post-mortem examination is threefold,—1st, the cause of death; 2d, an appreciation of the signs and symptoms; 3d, the nature of the disease. These inquiries are very distinct, but practitioners generally have only in view the two first. It frequently happens that, on the discovery of a lesion that seems to explain the fatal termination, they feel satisfied, and there is an end to the investigation. In medico-legal cases, this is the only object. But even here it is necessary to examine all the organs, to avoid a possibility of error, for how can any conscientious man form an opinion, that an abdominal disease has been fatal, if he be not satisfied by inspection that the chest and brain are healthy? Again, it often occurs that a particular sign or symptom is unusual or mysterious, and this, if explained by the examination, is sufficient for the practitioner. But it must be obvious that this throws no light upon the nature of the disease, or its mode of cure. To do this, morbid changes must be sought for, not in that advanced stage where they cause death, or occasion prominent symptoms, but at the very earliest period that can be detected. Hence we must call in the microscope to our assistance, and with its aid follow the lesion into the ultimate tissue of organs; we must observe the circumstances which produced it, as well as the symptoms and physical signs to which it gives rise, the secondary disorders, and the order of their sequence; their duration and mode of termination. This is the kind of extended investigation which can alone be serviceable to the advancement of medicine, and such, I trust, will be the object all of you will have in view in examining dead bodies. At all events, such are the views that I shall constantly endeavour to place before you during this course of clinical instruction.

The following is an arrangement of the organs, textures, etc., which demand your attention :—

I. External Appearances.—Number of hours after death. General aspect and condition of the body; peculiarities of person; marks on the surface; sugillation; amount of decomposition. In cases of suspected death by violence, great minuteness in the external examination is necessary.

II. Head.—Scalp; calvaria; meninges; sinuses; choroid plexus; brain, its form and weight; cerebellum, its weight; cortical and medullary substance of brain; ventricles, exact quantity of fluid in each, which should be removed with a pipette—its character; medulla oblongata; nerves, and arteries at the base of the brain; base of cranium; sinuses.

III. Spinal Column.—Integuments over spine; Vertebræ; Meninges; Cord; Nerves.

IV. Neck.—Thyroid gland; larynx and its appendages; trachæa; tongue; tonsils; pharynx; œsophagus.

V. Chest.—Thymus gland; lining membrane of bronchi; bronchial glands; pleuræ; contents of pleural cavity; parenchyma of lungs; large thoracic veins; pericardium, its contents; general aspect and position of the heart; its weight; amount of blood in its various cavities; right auricle; coronary veins; auricular septum; right ventricle, size of its cavity; thickness and degree of firmness of its walls; endocardium; tricuspid valve; pulmonary artery, its calibre; pulmonary veins; left auricle; mitral valve; left ventricle; thickness and condition of its muscular tissue; size of its cavity; sigmoid valves; coronary arteries; aortic opening and arch; large arteries of the neck; thoracic aorta, its structure and calibre.

VI. Abdomen.—Peritoneum and peritoneal cavity; omentum; position of abdominal viscera; stomach; duodenum; small and large intestines; liver, its weight, form, and structure—its artery, veins, and ducts; gall-bladder and its contents; portal system; pancreas and its duct; mesenteric and other absorbent glands; spleen, its weight, size, and structure; supra-renal capsules; kidneys, weight of each; secreting and excreting portions; pelvis; ureters; bladder; with the prostate and urethra in the male; in the female, uterus, ovaries, Fallopian tubes, vagina; abdominal aorta and vena cava; large abdominal arteries and veins; ganglia of the sympathetic system.

VII. Blood.—Appearance in the cavities of the heart, in aorta, vena cava, vena portæ, etc.; coagulated and fluid portions—adhesion or not of the former.

VIII.—Microscopic Examination of all the morbid structures and fluids, the blood, etc. etc.

In carrying out the post-mortem examination, the following hints may be attended to:—

1. As I have already said, the head, chest, and abdomen should always be examined, but the spinal cord and neck need not be disturbed unless the symptoms indicate some lesion there. In special cases, particularly judicial ones, however, every part should be carefully inspected, and in them it may be further necessary to investigate a variety of circumstances connected with external or surgical lesion, such as fractures, wounds, and burns; injury to the large vessels; alterations of the organs of sense, etc. etc.

2. Great care should be taken never to disfigure the body. Incisions through the skin, therefore, should be made in such directions that when the edges are afterwards sewn together, the necessary dissections below may not be visible. Neither should the body be exposed more than is needful, and delicacy demands that the genitals should always be kept covered. The wishes and feelings of friends and relations should invariably be held in consideration.

3. Before removing the stomach, or any portion of the intestines,

a ligature should be placed above and below the tube, which should afterwards be opened with the greatest care, and the character of the contents, whether gaseous, fluid, mucous, bloody, fœcal, or containing foreign substances, observed before washing and inspecting the mucous surface. This rule should be especially followed in all medico-legal investigations, in which, from neglect of it, the ends of justice have been frequently defeated.

4. You should seize every opportunity of opening dead bodies with your own hands, and acquiring dexterity in exposing the cavities, taking out the viscera, etc. Nothing is more painful than to see the brain cut into or contused, in removing the calvarium; or the large vessels at the root of the neck wounded in disarticulating the sternum, so that the surrounding parts are deluged with blood; or the cardiac valves cut through, instead of being simply exposed; or awkward incisions made into the intestines, whereby fœces escape; slipping of ligatures, etc. etc. Coolness, method, knowledge of anatomy, and skilfulness in dissection, are as necessary when operating on the dead as on the living body.

5. In examinations made at private houses, it is not always necessary to remove the viscera. The heart, lungs, liver, kidneys, etc., may be readily examined *in situ*. But in this Infirmary, where every facility exists, the viscera are invariably taken out, and after describing the morbid alterations they present, I shall always pass them round, so that every one present may examine them.

6. It is a good rule never to omit the examination of a morbid texture or product microscopically, until experience has made you perfectly familiar with its minute structure.

7. Notes of the examination should always be made at the time. If organs are healthy, this should be distinctly stated, so that hereafter all doubt as to their having been carefully examined may be removed. Here negative appearances are often of as much consequence as negative symptoms.

8. In describing morbid appearances, we should be careful to state the physical properties of an organ or texture, such as the size, form, weight, density, colour, position, etc.; and avoid all theoretical language, such as its being inflamed, tubercular, or cancerous, as well as such indefinite description as small and large, narrow and wide, increased or diminished, etc. etc. Size should always be stated in feet and inches, and the amount of fluid in quarts, pints, or ounces.

9. The amount of care and time bestowed on the examination of an individual body, will vary according to circumstances. In some cases it may require continued investigation, involving microscopical and chemical research for several days. I have never heard of a student regretting the employment of *too much* care in post-mortem investigation, although the occurrence of omissions from carelessness and unacquaintance with morbid anatomy, are unfortunately too often exhibited by medical men in courts of justice, to the detriment of our

profession in the eyes of the public, and not unfrequently to the perversion or suppression of justice.*

For the correct examination of the patient in the manner described, it will be found necessary to possess an accurate knowledge of the relative position of the various internal organs. This subject is not placed so carefully before the student as it deserves—a circumstance which may probably be attributed to the fact, that anatomy is for the most part taught by surgeons. But now that physical diagnosis constitutes so necessary a part of medical education, topographical, as distinguished from surgical anatomy, is every day felt to be more necessary. I would earnestly therefore recommend the student of Clinical Medicine to study the excellent work of Dr. Sibson on Medical Anatomy, in which this subject is admirably treated and illustrated. From his work I have borrowed the two accompanying figures, which exhibit at a glance the position of the internal organs in a healthy adult male after death. They also indicate the general

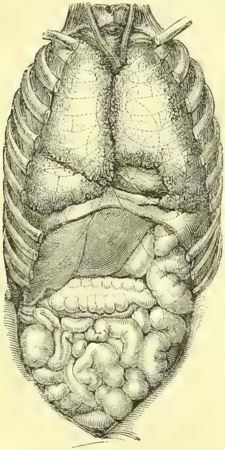

Fig. 1.

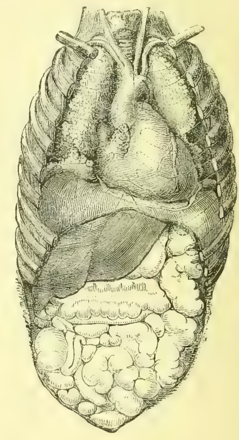

Fig. 2.

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* For an excellent guide to the examination of the dead body, I would recommend the practitioner and student to a work entitled, "What to Observe," published under the authority of the London Medical Society of Observation.

Fig. 1. Superficial view of internal organs after removal of the thoracic and abdominal parieties. Fig. 2. Deep view.

relation of the viscera to the fixed parts of the trunk and thoracic walls, the study of which is far more useful than learning the contents of various artificial regions marked out by lines on the surface of the body.

In studying all such relations of the viscera after death, it should be remembered that the organs do not occupy exactly the same position in the living body. "Expiration is the last act of life, and this last expiration is usually more extensive and forced than the expiration of tranquil life. In the dead body, the lungs shrink up within the position that they usually occupy during life; at the same time the heart and its vessels retract, and the abdominal organs follow the diaphragm somewhat upwards."—(*Sibson.*)

The remarkable changes which occasionally occur in the natural position of the internal viscera may be judged of from a case which occurred to Professor Easton of Glasgow, in a pregnant female, aged twenty-seven. The enlargement of the uterus, co-operating with a gradually increasing tendency to accumulation of fœces in the lower end of the colon, at length produced enormous distension of the sigmoid flexure, the ascending portion of which measured thirteen, and the descending twenty-five inches in circumference. The spleen and diaphragm were forced high up on the left side, compressing the

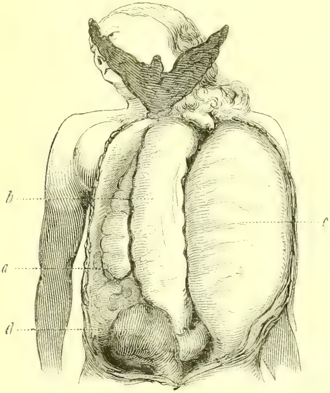

Fig. 3.

Fig. 3. Remarkable displacement of organs, in consequence of intestinal obstruction. *a*, Caput coli; *b*, ascending portion of sigmoid flexure; *c*, descending portion; *d*, gravid uterus turned a little down.

lung, and displacing all the neighbouring organs, so that on elevating the sternum and removing the ribs after death, the appearances represented Fig. 3 were exhibited.*

Besides the method of general examination previously detailed, it is further essential to employ various special modes of investigation. These are inspection, palpation, mensuration, percussion, auscultation, the use of the microscope, and of chemical tests. I propose giving you a short account of each of these modes of exploration.

INSPECTION.

Inspection of a part or of the whole surface of the body in various positions is often of the utmost importance. The latter is necessary in the examination of army recruits, but can seldom be carried out rigorously in hospital, and still less in private practice. Delicacy forbids it in females. The part affected, however, ought always to be seen, a neglect of which rule has led to numerous errors. The various eruptions which appear on the surface of the body are spoken of in another place. Here I shall only shortly allude to the inspection of the general posture, of the countenance, of the thorax, and of the abdomen.

Inspection of the general posture of the patient in repose and in motion is often highly diagnostic. Thus the position and attitude assumed by the body in cases of fever, in acute inflammations, in hemiplegia or paraplegia, in hydrothorax and asthma, in colic or spasmodic diseases, and even in various forms of insanity, are very characteristic. The description of these, however, belong to the consideration of individual diseases. As a general rule, the supine position denotes muscular debility—quick and forcible changes of position indicate excitement of the nervous system or spasm,—whilst fixed and restrained movements are dependent on paralysis or inflammatory pain. Some of these last may be occasioned by the state of respiration, or of the circulation through the heart.

Inspection of the countenance is a matter of such importance as to be instinctively had recourse to, with a view of determining the amount of pain, disturbance of the feelings, or general mental and bodily condition of the patient. A thorough knowledge of the indications so presented to the physician is only to be attained by long experience in the observation of disease. The cuticular surface may be so altered as to give a peculiar appearance to the complexion, especially in chronic diseases of the digestive system. The changes in the blood-vessels and blood indicate palor or flushing; the sallow and yellow hue observed in some disorders; the state of tumidity or shrinking, of heat or coldness, and of dryness or moisture. Changes in the subcutaneous and muscular tissues indicate emaciation, or œdema, languor, and various kinds of convulsion or paralysis. The individual features also require to be studied, especially the eye and mouth. Pain, if in the head, causes the brow to corrugate; if in the chest, the nostrils to be drawn upwards; if in the abdomen, the lips to be raised and stretched over the gums and teeth. These changes are more readily observed in children in whom they are not under the control of the will.

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* Monthly Journal of Medical Science, Dec. 1850, p. 494.

Inspection of the Chest.—This refers to the form and configuration of the entire thorax, or its various parts, and to a careful comparison of the two sides when at rest and when in motion. It is often difficult, in cases where changes are not well marked, to determine them by mere inspection. To do so, a good light, and a proper position, both of the observer and of the patient, are necessary. The observer should, if possible, be directly in front of the patient, and whenever the case admits of it, the latter should be in the sitting posture. The chest may be so altered in disease as to be irregular or unsymmetrical, from alterations, congenital or acquired, in the form of the bones of the vertebral column or thoracic walls. Various portions of it may be expanded or bulge out, as in cases of empyema or thoracic tumours; or it may be retracted and depressed, as occurs in chronic phthisis. A case presented itself to the late Dr. Spittal at the Royal Dispensary of this city, where the retraction was so great on one side, that the student in charge of it had placed compresses on the sound side, in the belief that the healthy prominence there was indicative of a tumour. The motions of the chest bear reference to inspiration and expiration,* which pass imperceptibly into one another, and can be made more rapid or prolonged voluntarily. A forced inspiration gives rise to more thoracic movement in the female than in the male, in whom it is more abdominal. In disease these motions are altered in various ways—1st, By general excess or diminution, as in cases of spasmodic asthma or laryngeal obstruction. 2d, By partial immobility, as in pleurisy; or by augmented expansion, as in the side opposite a pneumonia or pleurisy. 3d, By increased rapidity, as in pericarditis; or unusual slowness, as in comatose diseases.

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* "During inspiration, the clavicles, first ribs, and through them the sternum and all the annexed ribs, are raised; the upper ribs converge, the lower diverge; the upper cartilages form a right angle with the sternum, and the lower cartilages of opposite sides, from the seventh downwards, move further asunder, so as to widen the abdominal space between them, just below the ziphoid cartilage: the effect being to raise, widen, and deepen the whole chest, to shorten the neck, and apparently to lengthen the abdomen. During expiration, the position of the ribs and cartilages is reversed; the sternum and ribs descend; the upper ribs diverge, the lower converge; the upper cartilages form a more obtuse angle with the sternum, and the lower cartilages of opposite sides approximate, so as to narrow the abdominal space between them, just below the ziphoid: the effect being to lower, narrow, and flatten the whole chest, to lengthen the neck, and apparently to shorten the abdomen. It is to be observed, that during inspiration, while the ribs and sternum are moving upwards, the lungs and heart, and the abdominal organs, are moving downwards, and that, consequently, viewed in relation to the ribs, the descent of the internal organs appears to be greater than it really is."—(*Sibson*).

Inspection of the Abdomen.—The abdomen in health is slightly convex, and marked by elevations and depressions, corresponding to the muscles in its walls, the umbilicus, and prominences of the viscera below. It varies according to age and sex—in youth being smoother and flatter than in the adult, and in females being broader inferiorly than in males, from the greater width of the pelvis. In disease it may be, 1st, enlarged generally and symmetrically, as in dropsies, or partially and irregularly, from ovarian, hepatic, splenic, and other tumours; 2d, it may be retracted—generally from extreme emaciation, or partially, from local intestinal obstruction. The superficial abdominal veins are sometimes greatly enlarged, and at others distinct pulsations are visible, dependent on deep-seated cardiac, or arterial disease. The abdomen, like the chest, is in constant movement in connection with the act of respiration, and may be observed to be more prominent during inspiration, and more flat during expiration. These respiratory movements of the abdomen bear a certain relation to those of the chest, being often increased when the latter are arrested, and *vice versa.* Thus, in pleurisy, the respiratory movements are mostly abdominal, whereas in peritonitis, they are altogether thoracic. The variations observable in the disturbed relations of the respiratory movements in the thorax and abdomen are often highly instructive, especially in cases of dyspnœa from hydro-thorax, spasmodic asthma, anæmia, ascites, abdominal tumours, etc.

The inspection of deep-seated cavities, by means of specula, etc., will be referred to under the head of special diseases.

PALPATION.

Palpation also is a necessary mode of examination, and is sometimes practised by simply applying the tips of the fingers, at others, by placing the hand on the part affected, and not unfrequently by employing both hands, and pressing with them alternately. This latter method is most applicable in endeavouring to judge of tumours, especially when large or deep seated, and situated in the abdomen. The position of the patient during palpation must be varied according to the part examined. The horizontal posture is best to judge of deep-seated pulsations and vibrations, but sometimes the erect posture, or even leaning forward, becomes necessary, as when the heart is being examined. When feeling the abdominal organs through the integuments, these last should be relaxed, by causing some one to flex the inferior extremities on the abdomen, and push the head and neck forwards. In this manner palpation affords information—1st, As to the increased or diminished sensibility of various parts; 2d, Of their altered form, size, density, and elasticity; and, 3d, Of the different kinds of movement which they may be thrown into.

1. When pain is experienced in any part, it is generally increased by pressure and movement, if inflammatory, but is often relieved if neuralgic. Not unfrequently pressure causes pain or tenderness where otherwise neither are experienced. Thus deep pressure in the right iliac region causes pain in typhoid fever, which, however, must be judged of from the expression of the countenance, rather than the statement of the patient. Again, over the vertebral column pressure or percussion may induce pain that is otherwise not felt. In paralytic cases the diminution of sensibility can only be ascertained by feeling or pinching the part, and the limitation of anæsthesia is best arrived at by pricking the surface with some pointed hard substance.

2. Alteration in external form and size may be judged of by inspection, but in internal organs, especially abdominal ones, we derive more exact information from palpation conjoined with percussion, as in cases of hypertrophied liver and spleen, or when tumour exists. In such cases we can feel from the increased density and resistance the size and even outline of the morbid growths, which will be more or less distinct, in proportion as they are near the surface, and circumscribed in form. Occasionally organs are diminished in size, and cannot be felt in their normal positions, as when the inferior margin of the liver cannot be detected in this way, from atrophy. The natural elasticity of parts may also be increased or diminished. Thus the abdomen is more elastic when air is in excess in the intestines, and less so when the peritoneum contains liquid. The integuments also may be more rigid and indurated, as in chronic skin diseases, or, on the other hand, soft and doughy, as in œdema, when they pit on pressure, from diminished elasticity.

3. Certain motions in the thoracic and abdominal cavities, as well as in other parts of the body, are best judged of by palpation. It is in this way that the character and situation of pulsation at the heart, root of the neck, or elsewhere, are determined. The expansive motion of the thorax and abdomen during respiration is also thus ascertained. If we place the two hands, with the fingers spread out like a fan in the axillæ or flanks, and bring the two thumbs towards each other, near the sternum or umbilicus, we can judge by their approach and separation, the amount of expansion or retraction that takes place. Application of the hand also allows us to detect undulatory motions below the integument, and to determine the existence of vibrations, frictions, gratings, and crepitations. Rostan relates a case where all the symptoms of acute intercostal rheumatism were present (which disease was diagnosed), caused by a broken rib, that was overlooked from the diseased part not having been examined by palpation. There is a natural *fremitus* or thrill perceptible on placing the hand on the chest, when a person is speaking, which is increased in some diseases of the chest, and lessened in others. This sensation is also

sometimes felt in the large blood-vessels. It resembles more or less the vibration felt on placing the hand on the back of a cat while purring. ***Fluctuation*** is another sensation, caused by pressing on or percussing parts in such a way as to cause displacement of their contained fluids. A modification of it is known under the name of *succussion*, when produced by shaking the patient—a proceeding, however, which is seldom necessary.

MENSURATION.

The simplest way of measuring the circumference of parts, or the distance between any two fixed points, is by means of a graduated tape. In ascertaining the circular measurement of the chest or abdomen, that moment should be chosen when the patient holds his breath at the end of an ordinary expiration, and great care should be taken that the tape is carried evenly round the body. The relative mensuration of the two sides of the chest or abdomen, is best accomplished by choosing the spinous processes of the vertebræ as fixed points on the one hand, and a line drawn through the centre of the sternum and umbilicus on the other. The exact levels of the measurements should always be noted, such as at the nipples, margin of the lower ribs or umbilicus, which are those most deserving of observation. The diameter of the trunk in various directions is best ascertained by means of a pair of callipers.

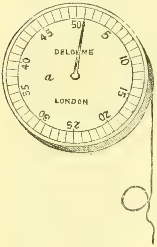

Fig. 4.

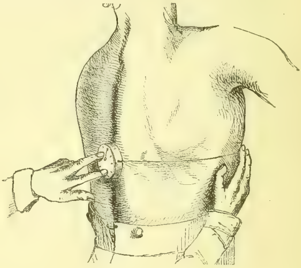

Fig. 5.

The amount of motion in the chest and abdomen, and of its various parts, are capable of being accurately determined by means of

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Fig. 4. The stethometer of Dr. Quain, half the real size.

Fig. 5. Mode of applying the instrument when the string is used.

the chest-measurer of Dr. Sibson (Fig. 6), or the stethometer of Dr. Quain (Fig. 4). Both instruments are composed of a brass box, having a dial and index, which is moved by a rack attached to a prolonged pinion or a string. One revolution of the index indicates an inch of motion in the chest; the intervening space being graduated. It has been found necessary, when making observations on the respiratory movements, whether of the chest or of the abdomen, to divert the patient's attention, and make him look straight forwards, otherwise these movements become so affected as to vitiate the results. The instruments may be applied in the sitting or recumbent posture. The method of applying them with a string attached, is shewn (Fig. 5), and the mode of using Dr. Sibson's chest-measurer by placing the pinion on the nail of the observer's finger, moving with the chest, is

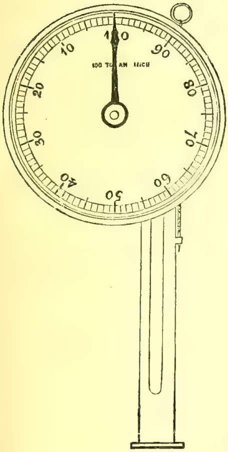

Fig. 6.

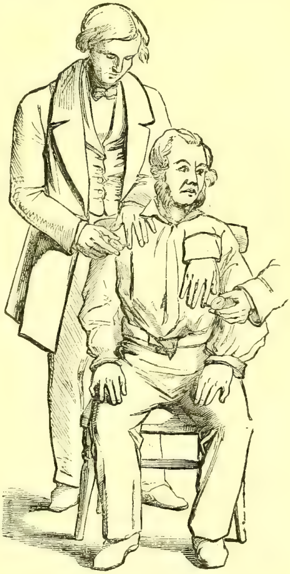

Fig. 7.

Fig. 6. The chest-measurer of Dr. Sibson, natural size.

Fig. 7. Mode of applying the chest-measurer.

seen (Fig 7). If held in the hand, as in Figs. 5 and 7, great steadiness and care are requisite to arrive at exact results. Dr. Sibson's instrument may be attached to brass rods, which are bent at right angles, so as to present the form of]. The upper arm is moveable, and admits of elongation by means of a split tube, so that in this way great steadiness is arrived at, while the instrument itself can be carried to any part of the chest or abdomen, without disturbing the position of the patient, as seen in Fig. 8.

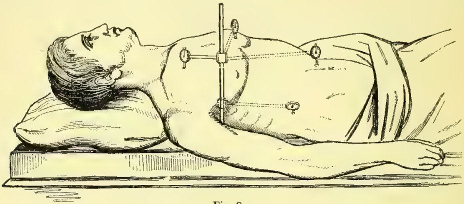

Fig. 8.

According to the observations of Dr. Sibson, made with this instrument, the respiratory movements in health may be thus represented in 100th's of an inch.

Instrument applied to	Side.		Involuntary tranquil respiration	Voluntary forced respiration about
Centre of sternum between 2d costal cartilages			3 to 6	100
2d Rib near the costal cartilage	right		3 ,, 7	110
	left		3 ,, 7	110
Lower end of sternum			2 ,, 6	95
5th Costal cartilages near the rib	right		3 ,, 6	95
	left		2 ,, 5	85
6th Rib at the side	right		5	70
	left		3	60
10th Rib	right		10	65
	left		9	60
Abdomen	centre	boy	25	90
		man	25 to 30	100
	right		9	
	left		8	

There is, however, considerable variation even in health in different persons. Some, for instance, can cause the second rib to advance two and a quarter inches during forced inspiration, whilst others can only cause it to advance three quarters of an inch. The motion of the

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Fig. 8. Mode of application of the chest-measurer, attached to brass rods, bent at right angles, when the patient is in the horizontal posture.—(*Sibson.*)

whole left side, excepting that of the second rib, is somewhat less than on the right side. It should also be remembered that the motion of the tenth ribs indicates that of the diaphragm. The pressure of the stays in the female exaggerates the thoracic and diminishes the abdominal movements.

In disease it may be observed as a general rule, that if the respiratory movements are restrained in one place, they are increased elsewhere. We have already alluded to the relation existing between thoracic and abdominal movements (see Inspection). The amount of these may be exactly ascertained by the chest-measurer. In the same manner the diminished movements on one side of the chest in pleuritis, pneumonia, and incipient phthisis, can be determined and compared with the exaggerated motion on the opposite. Thus in phthisis, instead of the indicator of the instrument placed over the second rib, on the affected side, moving between 1 and 110 on forced inspiration, as in health, it may only move between 1 and 30. In making observations with the chest-measurer, considerable practice and skill are necessary, as in the employment of all other instruments. It enables us to arrive at great accuracy, and constitutes an extra means of exploration, without, however, being absolutely necessary for arriving at a correct diagnosis in every case.

The expansibility of the lungs, and the amount of air expelled from the chest after full inspiration, may also be measured by the spirometer of Mr. Hutchinson. But the necessity of determining the height and weight of the individual, of teaching him how to inspire and expire, of paying attention to the muscular force and other circumstances, so interferes with the correct conclusions to be derived from this mode of exploration, as to render it valueless in the examination of every case. But as a means of physiological research in determining the vital capacity of the chest, Mr. Hutchinson's investigations are of the utmost importance.

PERCUSSION.

The object of percussion is to ascertain the density and size of organs. It may be practised directly, or through the medium of an

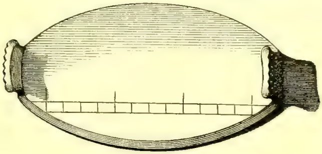

Fig. 9.

interposed body (mediate percussion). Without knowing how to strike, and to produce clear tones, we can never educate the ear, or the sense of resistance. This preliminary part in the art of percussion, requires a certain dexterity, which some find it very difficult to obtain. The difficulty seems to depend, in some cases, on a deficiency in the proportions usually existing between the length of the fingers. Thus, I have seen more than one person who had the index finger nearly an inch shorter than the middle one, and who, consequently, found it impossible to strike the pleximeter fairly with the tips of two fingers at once. By far the most common cause of failure, however, is want of patience and perseverance to overcome the first mechanical difficulties; and there is every reason to believe that could this be surmounted, accurate percussion would become more universal and better appreciated. Without entering into the numerous discussions which have arisen as to the superior advantages of one plan as compared with another, or of using this or that instrument, I may mention, that for the last sixteen years I have employed a pleximeter and a hammer. These instruments I can confidently recommend to you as the readiest means of obtaining accurate results at the bed-side by means of percussion.

The ivory pleximeter I use is that of M. Piorry, as modified by M. Mailliot. Its length is two inches, and breadth one. It possesses two handles, and an inch and half scale drawn upon the surface. It may be applied with great precision to every part of the chest, even in emaciated subjects (Fig. 9).

The hammer is the invention of Dr. Winterich of Wurzburgh. The advantages it possesses are, —1st, That the tone produced, in its clearness, penetrativeness, and quality, far surpasses that which the most practised percussor is able to occasion by other means. 2d, It is especially useful in clinical instruction, as the most distant student is enabled to distinguish the varieties of tone with the greatest ease. 3d, It at once enables those to percuss, who, from peculiar formation of the fingers, want of opportunity, time, practice, etc., are deficient in the necessary dexterity (Fig. 10).

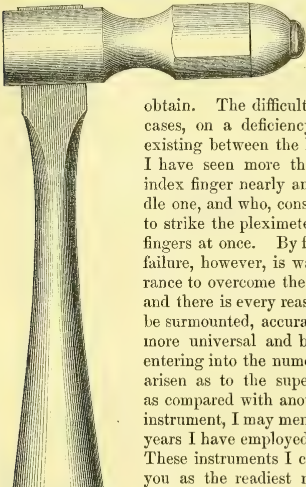
Fig. 10.

With the assistance of the instruments I now recommend to you, every student acquainted with the relative situations of the different thoracic and abdominal organs, is himself enabled, without other preliminary education, to detect the different degrees of sonoriety they possess in a state of health and disease. I may say, that by means of these instruments, after one hour's practice on a dead body, he is placed on a par (as regards the art of percussion) with the generality of experienced practitioners in this country; and any of you, after one month's employment of them, will be enabled to mark out accurately on the surface of the body, the size and form of the heart, liver, spleen, etc.

Of the Different Sounds Produced by Percussion.

The sounds produced by percussion arise from the vibrations occasioned in the solid textures of the organ percussed. The different density and elasticity of these textures will of course more or less modify the number and continuance of the vibrations, and give rise to different sounds.

M. Piorry considers that nine elementary sounds are thus formed, which he has designated, from the organ or part which originates them, "*femoral*, *jecoral*, *cardial*, *pulmonal*, *intestinal*, *stomacal*, *osteal*, *humorique*, and *hydatique*." I consider that all these sounds may be reduced to three elementary ones; that, in point of fact, there are only three tones occasioned by percussion, and that all the others are intermediate. These three tones are respectively dependent,—1st, On the organ containing air; 2d, On its containing fluid; and, 3d, On its being formed of a dense uniform parenchymatous tissue throughout. These tones, therefore, may be termed the *tympanitic*, the *humoral*, and the *parenchymatous*. Percussion over the stomach gives the best example of the first kind of sound; over the distended bladder, of the second; and over the liver, of the third. Certain modifications of these sounds occasion the *metallic* and the *cracked-pot* sound. The latter is made audible over the chest under a variety of circumstances, by percussing with the mouth open. The terms jecoral, cardial, pulmonal, intestinal, and stomacal, however, may be used to express those modifications of sound produced in percussing respectively the liver, heart, lungs, intestines, and stomach.

No description will suffice to convey proper ideas of the various alterations of tone occasioned by percussing over the different thoracic and abdominal viscera. To become acquainted with these, it is absolutely necessary to apply the pleximeter to the body, and then half an hour's practice with this instrument and the hammer will be sufficient to render any one conversant with those which may be heard in a normal state.

It must be remembered, however, that the tones even then may vary according to circumstances. Thus, immediately after a deep inspiration, the pulmonal sound will be rendered more tympanitic, and, after expiration, more parenchymatous. In the same manner, the stomach and intestines may give out different sounds according as they are more or less full of contents. In the left or right iliac fossa a clear tympanitic sound will be heard when the intestine below is empty, and a dull parenchymatous sound when it is full of fœces.

A study of the different modifications of sound, which various organs thus produce in a state of health, readily leads to the comprehension of the sounds which may be elicited in a morbid state. Thus, the lungs may occasion a dull or parenchymatous sound, from solidification, the result of exudation, or, on the other hand, become more tympanitic, from the presence of emphysema. The abdomen may give out a parenchymatous sound, from enlargement of the uterus or an ovarian tumour; or a humoral sound, from the effusion of fluid in the cavity of the peritoneum.

Of the Sense of Resistance produced by Percussion.

By the sense of resistance is understood the peculiar sensation resulting from those impressions which are communicated to the fingers on striking hard, soft, or elastic bodies. It is of the greatest service in determining the physical condition of the organ percussed. The sense of resistance bears relation to the density of the object struck, —hence firm and solid textures offer more resistance than those which are soft or elastic. The thorax of the child is elastic, whilst that of the adult is unyielding. Of all the thoracic and abdominal organs, the liver presents the greatest degree of resistance, and the stomach the least. The presence of fluid in the hollow viscera, offers a medium of resistance between the parenchymatous organs on the one hand, and those containing air on the other. But air much condensed, or fluid contained within the rigid walls of the thorax, may offer a considerable degree of resistance.

The sense of resistance should be as much educated by the physician as the sense of hearing, and it would be difficult for an individual, practised in the art of percussion, to say which of these two points is the more valuable to him. Both are only to be learnt by practice, and considering it perfectly useless to describe that in words which may be learnt in half an hour, by the use of the pleximeter and hammer on a dead body, or the living subject, I shall now proceed to describe the

General Rules to be followed in the Practice of Mediate Percussion.

1. The pleximeter should be held by the projecting handles between the thumb and index finger of the left hand, and pressed

firmly down upon the organ to be percussed. Much depends upon this rule being followed, as the sound and sense of resistance are considerably modified according to the pressure made by the pleximeter. A very easy experiment will prove this. If, for instance, the pleximeter be struck while it rests lightly on the abdomen over the umbilicus, and again, when it is pressed firmly down amongst the viscera, the change in tone will be at once perceived. In the first case, a dull sound is produced, from the muscles and integuments being alone influenced by the force of the blow; in the second case, a clear tympanitic sound is occasioned from the vibration of the walls of the intestine. In every instance, therefore, the pleximeter should be so held and pressed down, as to render it, so to speak, a part of the organ we wish to percuss.

2. Great care must be taken that no inequality exist between the inferior surface of the pleximeter and the skin. Firmly pressing it down will always obviate this when the abdomen is examined. As regards the thorax, the groove over the anterior mediastinum, the prominence of the clavicles and of the ribs, in emaciated subjects, may allow a hollow to exist under the instrument, by which a deceptive tympanitic sound is occasioned. By a little management, however, with the small and oval pleximeter I have recommended, this may readily be avoided.

3. The hammer should be held, as advised by Dr. Winterich, between the thumb and the first and third fingers, the extremities of which are to be placed in hollows prepared for them in the handle of the instrument. By some these are considered useless, but in all cases where slight differences in tone are to be appreciated, I have found this the best mode of employing it. Ordinarily, however, it will be sufficient to hold it by the extremity of the handle, merely in such a manner as will enable the practitioner to strike the pleximeter lightly, or with force, as occasion may require.

4. Care must be taken to strike the pleximeter fairly and perpendicularly. Unless this be done, vibrations are communicated to textures in the neighbourhood of the organ to be percussed, and fallacious results are the consequence. If in percussing the lungs, for example, the blow be made obliquely, we obtain the dull sound produced by the rib, and I have seen considerable error in the diagnosis thus occasioned.

5. A strong or gentle stroke with the hammer will modify the tone and sense of resistance, inasmuch as the impulse may be communicated by one or the other to a deep-seated or a superficial organ. Thus a gentle stroke will elicit a pulmonal tympanitic sound just below the fourth rib, where a thin layer of lung covers the liver, but a strong one will cause a jecoral parenchymatous sound. At the inferior margin of the liver, on the other hand, where a thin layer of the organ covers the intestines, the reverse of this takes place, a gentle stroke occasioning a dull, and a strong one a clear sound.

6. By withdrawing the hammer immediately after the blow, we are better able to judge of the sound; by allowing it to remain a moment, we can judge better of the sense of resistance.

7. The integuments should not be stretched over the part percussed, as when the stethoscope is employed, for an unnatural degree of resistance is thus communicated to the hand of the operator from the muscular tension. In every case, especially where the abdomen is examined, the integuments and superficial muscles should be rendered as flaccid as possible.

8. It is always best to percuss on the naked skin. It is not absolutely essential, however; and in cases where, from motives of delicacy, it is desirable that the chest or abdomen be not exposed, it only becomes necessary that the covering of linen or flannel be of equal thickness throughout, and not thrown into folds.

9. The position in which the individual examined should be placed, will vary according to the organ explored. In percussing the thoracic organs and the liver, a sitting position is most convenient. The stomach, intestines, uterus, bladder, and abdominal tumours or effusions, are best examined when the patient is lying on the back, with the knees flexed so as to relax the abdominal walls, and, if necessary, the head and neck bent forward, and supported by pillows. In percussing the spleen, the individual should lie on the right side; and when the kidneys are examined, he should lie on the breast and abdomen. In cases of effusion into the serous cavities, a change of position furnishes most valuable indications.

10. In percussing any particular organ, the pleximeter should be first applied over its centre, where the sound and sense of resistance it may furnish are most characteristic. Two blows with the hammer are generally sufficient to determine this. From the centre, the pleximeter should be moved gradually towards the periphery, or margin of the organ, and struck as it proceeds with the hammer, now forcibly, now lightly, until the characteristic sound of the next organ be elicited. The pleximeter is then gradually to be returned towards the organ under examination, until the difference of tone and sense of resistance become manifest. In this manner having first heard the two distinct sounds well characterised, we shall be better enabled to determine with accuracy the limit between the one and the other. This may be done exactly after having determined whereabouts the line of separation is, by placing the long diameter of the pleximeter transversely across it, and striking, first one end of the instrument, and then the other, till the precise spot is determined. This spot should now be marked, by placing with a pen a dot of ink on the skin. The opposite and then other portions of the margin of the organ should be limited in the same manner, and these in turn should be marked with dots of ink, until the whole organ be completely examined. Then by uniting all these dots with a line of ink, we have the exact form of the organ drawn upon the skin. When it is thought necessary to render the first mark permanent, in order to

see if any subsequent change take place in the size of the organ, or extent of the dulness, it may be rendered so, by carrying lightly a stick of argent. nit. over the ink line, while it is still moist.

SPECIAL RULES TO BE FOLLOWED IN PERCUSSING PARTICULAR ORGANS.

Before proceeding to percuss individual organs in persons labouring under disease, you should obtain a general knowledge of the limits and intensity of dulness on percussing the thoracic and abdominal viscera in health. The accompanying figures convey this information with great accuracy, the depth of tint corresponding to the dulness of tone and amount of resistance. The normal sonoriety and dulness exhibited, (Figs. 11 and 12), will enable you to compare with readiness the alterations revealed by percussion under a variety of diseased conditions.

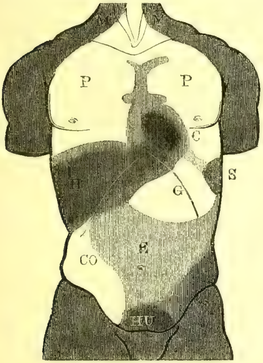

Fig. 11.

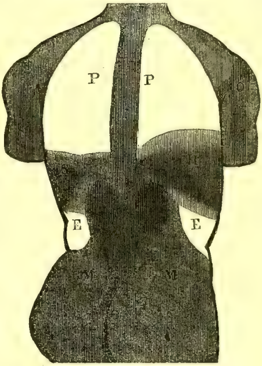

Fig. 12.

Lungs.—Percussion of the lungs generally bears reference to a change in density, which is only to be detected by comparing the healthy with the morbid portions. The great practical rule here to be followed is, to apply the pleximeter to both sides of the chest in succession, with the same firmness, exactly in the same situation, and let the blow with the hammer be given with the same force. Care must be

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Fig. 11, Anterior, and Fig. 12, posterior view of the limits and intensity of dulness on percussion. P, pulmonal sound; C, cardiac sound; H, hepatic sound; S, splenic sound; G, gastric sound (here the stomach is moderately distended with air); E, enteric sound. In the anterior view the intestines are tolerably free from air, except CO, colic sound, from distended colon. The descending colon and rectum are filled, and sound dull. HU, humoral sound, over a distended bladder; M, muscular, and O, osteal sounds.—(*Piorry.*)

taken that the position of both arms be alike, as the contraction of the pectoral muscles on one side more than on the other may induce error. In short, every circumstance must be the same before it is possible to determine, in delicate cases, either from the tone or sense of resistance, whether change of density exist in the lungs. When circumscribed alterations are discovered in the pulmonary tissue, their limits may be marked out on the surface of the skin, in the manner previously indicated. In this way I have frequently succeeded in determining with accuracy the size and form of circumscribed indurations, arising from partial pneumonia and pulmonary apoplexy. Under the clavicles, the pleximeter must be applied with great firmness. Inferiorly, a thin layer of lung lies over the superior surface of the liver; and to determine the exact place where its inferior border terminates, the blows with the hammer should be very slight. Posteriorly, also, the pleximeter must be firmly applied, and the force of the blows considerable; but they should decrease in force inferiorly, where a thin layer of lung descends over the liver much deeper than anteriorly.

In a healthy state, a distinct difference may be observed in the sonoriety of the lungs immediately after a full expiration and a full inspiration. This does not take place when the tissue becomes indurated from any cause; and thus we are furnished with a valuable diagnostic sign. Congestion of the lung, and pneumonia in its first stage, cause only slight dulness and increased resistance, which, however, are readily detected by the practised percussor. In the second and third stage of pneumonia, and in apoplexy of the lung, this dulness and resistance are well marked, and even an impression of hardness and solidity communicated to the hand. When, however, the lung is infiltrated with tubercle, the induration is most intense, and the greatest degree of resistance communicated.

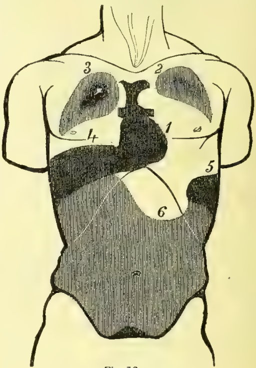

Fig. 13.

Partial indurations from apoplexy or simple cancerous and tubercular exudation, may be detected by percussion, even when deep-seated and covered by healthy portions of the lungs. In this case, by pressing with the pleximeter, and striking lightly, a tympanitic sound

Fig. 13. *Phthisis—Atrophied heart and liver—Prolonged abstinence.* 1, Atrophied heart; 2, Infiltrated tubercle on left side; 3, The same on right side with a cavity; 4, Atrophied liver; 5, Spleen; 6, Unusual dulness over abdomen, from prolonged abstinence.—(*Piorry.*)

only is heard; but by pressing the pleximeter down firmly, and striking with force, the dull sound may be elicited and circumscribed. When indurations, however, exist inferiorly in those portions of the lungs which overlap the liver, it requires great practice to detect them with certainty. Caverns in the lungs, when large and filled with air, induce a tympanitic sound (Fig. 13, 3); but they are generally more or less full of viscous and fluid matters, and give rise to dulness.

Two or three ounces of fluid may be detected in the pleural cavity, by causing the patient to sit up. The height or level of the fluid is readily determined, and should be marked daily by a line made with nitrate of silver. If the effusion be only on one side, the increased dulness is more easily detected. It disappears on placing the patient in such a position as will cause the fluid to accumulate in another part of the pleural cavity, when the space which was previously dull becomes clear (Fig. 14). When the effusion entirely fills the pleural cavity, no limit, of course, can be detected; but, even then, the dulness is distinguished from that of the liver by the diminished feeling of resistance.

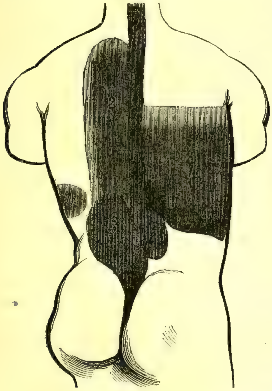

Fig. 14.

When the lung is emphysematous, or if air be present in the pleura, the sound becomes unusually tympanitic; this tympanitic note on percussion, however, may exist under a variety of circumstances, which it is of great importance to be acquainted with. Thus, condensation from pneumonia at the posterior part of the lung, or partial pleurisy, by causing the anterior portion of the organ to be over-distended with air, or compressed and pushed forward, may give origin to this sound. The same occurs in chronic phthisis, over parts which were once dull, either from large dry cavities filled with air, or from the emphysema which accompanies cicatrices and partial condensation of pulmonary texture.

On percussing the chest with the mouth open, there may frequently be elicited a sound, which Laennec first likened to gently striking a cracked pot. It may be very closely imitated by crossing the palms of both hands, so as to leave a hollow between them, and then striking the knuckles of the inferior hand against the knee, so as to produce a clinking sound. I have produced it by percussing the chest in cases of pleurisy, pneumonia, and phthisis; of congested, apoplectic, and

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Fig. 14. *Pleurisy.* 1, On the right side when in the erect position; 2, On the left side, when lying on the right; 3, Kidneys; 4, Spleen.—(*Piorry.*)

emphysematous lungs, and even when these organs were quite healthy, if, as in young subjects, the ribs are very elastic. The conditions which seem favourable for the production of this sound, are, 1st, A certain amount of confined or tense air in the tissue of the lung; 2d, The sudden compression of this air by a solid body in its neighbourhood; 3d, Communication of this air with the external atmosphere. Hence it is not diagnostic of any particular disorder, or pathological state, such as a pulmonary cavity, so much as of a physical condition, which, however, if rightly interpreted, is likely to be of the utmost advantage in our efforts at detecting the nature of diseases.*

Heart.—To mark out the precise limits of the heart, constitutes the first difficult lesson in the art of percussion. M. Piorry commences by determining the clear sound at the upper end of the sternum, and bringing the pleximeter gradually downwards till the dull sound of the heart be heard. I have found it best to place the instrument first under and a little inside the left nipple, where the cardiac dulness is most intense; then to carry it upwards, striking it continually with the hammer until the clear sound of the lung be elicited; then, by bringing it down again towards the heart, we shall readily distinguish the line where cardial dulness commences, and thus limit the superior margin of the organ. The same method is to be followed in determining the situation of the lateral margins, only carrying the pleximeter outwards or inwards, striking more and more forcibly with the hammer, until the clear tympanitic sound of the lung only be heard. It is more difficult to determine the situation of the apex of the heart; for as this rests on the diaphragm, and this again upon the left lobe of the liver, it cannot readily be distinguished from them. The size of the heart, however, may be pretty accurately estimated, by limiting its superior and lateral margins. In females, the left mammary gland should be drawn upwards and outwards by an assistant. In the natural position of the organ (Figs. 1 and 2) it is well to remember that the auricles are on the right, and the ventricles on the left side.

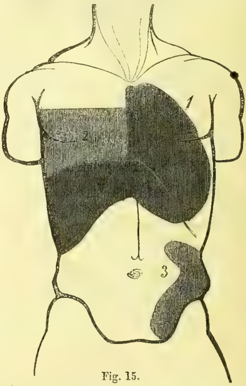

Fig. 15.

The normal size of the heart differs in different persons. As a general rule, however, it may be considered that, if the transverse diameter of the dulness measure more than two inches, it is abnormally enlarged. It has been known to measure seven inches. (Piorry.) In hydropericardium, the dulness has been remarked to exist rather at the superior part of the sternum, than on one side or the other. (Piorry, Reynaud.) In pericarditis it bulges out inferiorly (Fig. 15, 1). In hypertrophy and dilatation of the right auricle, the increased extent of the dulness stretches towards the median line, and sometimes passes over it (Fig. 16, 3). In similar hypertrophy of the left ventricle, the dulness extends on the left side more or less, according to the increased size of the heart (Fig. 16, 1, and Fig. 17). In concentric hypertrophy, there is little or no enlargement, but the density is greatly increased, which is readily detected by the feeling of resistance.

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* See the author's "Clinical Investigation into the diagnostic value of the cracked-pot sound."—*Edinburgh Medical Journal for March* 1856.

Fig. 15. *Pericarditis, pneumonia, and loaded rectum.* 1, Pericarditis; 2, Pneumonia, separable from the extreme dulness of the liver; 3, Loaded rectum.—(*Piorry.*)

The presence of tubercle in the lungs surrounding the heart; aneurisms or other tumours pressing upon, or in the neighbourhood of, the organ; hypertrophied liver, extensive empyema, etc. etc., may render its mensuration difficult or impossible. The changes in position of the heart from a pleurisy on one side pushing it towards the opposite one, or from the pregnant uterus, an ovarian tumour or ascites thrusting it upwards, may also be determined by percussion, especially if the impulse can be distinguished by palpation or ascultation.

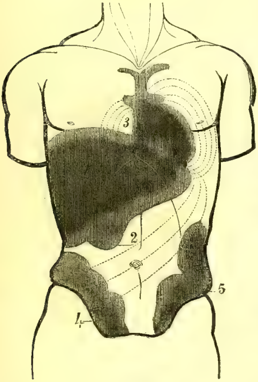

Fig. 16.

Liver.—Limitation of the size of the liver should be commenced by placing the pleximeter over the organ on the right side, where the dulness and resistance are greatest. It should then be carried upwards, until the clear sound of the lung be distinguished, when it ought again to be brought down, and the limit marked. This limit, however, may indicate either the inferior margin of the lung, or superior convex surface of the liver. Now, as a thin layer of lung descends in front of the liver, it will be necessary to determine where the tympanitic sound ceases inferiorly, by striking gently with the hammer, and where the parenchymatous sound ceases superiorly, by striking forcibly, so that vibrations may be communicated to the organ through the layer of lung. The space between these two lines thus marked on the surface is wider in some individuals than

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Fig. 16. *Hypertrophy of liver and heart.* 1, Hypertrophied liver, which may be still further enlarged to the dotted lines over the abdomen; 2, Distended gall-bladder; 3, Hypertrophied right auricle—1, Hypertrophied ventricles; 4, Loaded cœcum; 5, Loaded rectum and descending colon.—(*Piorry.*)

in others, and deeper and more extensive posteriorly than anteriorly. By carrying the pleximeter from the right side anteriorly, and then posteriorly towards the left of the patient, the whole superior margin may be thus detected, and marked with ink upon the surface, except where the liver comes in contact, through the medium of the diaphragm, with the apex of the heart. The inferior margin is for the most part readily detected. It must be remembered, however, that in the same manner as a thin layer of lung covers the upper margin, so a thin layer of liver descends on the right side over the intestine. It is, therefore, necessary to be cautious in determining the inferior margins, for a tolerably strong blow with the hammer may give rise to a tympanitic sound from the intestine, heard through the liver. The lower margin must be percussed in an inverse manner to the superior, and as we proceed downwards, the force of the blow should be diminished. The inferior margin of the liver is in general readily detected, from the contrast which, on percussion, its dulness and density present, contrasted with the tympanitic and elastic feel of the intestines and stomach.

The superior limit of this organ is generally found about two inches below the right nipple, or corresponding with the fifth rib. Its inferior border descends to the lower margin of the ribs. The extent of the jecoral dulness in the healthy state is in general two inches on the left side, three inches in the hepatic region anteriorly, and four inches in the hepatic region laterally. (Piorry.)

Variations in the size of the liver, from congestion, inflammation, abscesses, hydatids, tumours, atrophy, etc. etc., may often be exactly determined by means of percussion. In icterus, the increase and diminution of this organ, as evinced by lines marked on the skin, will generally be found to bear a proportion to the intensity of organic disease. When tumours are present, the inferior border often presents an irregular form. If the inferior lobes of the lung be indurated by tubercles or hepatisation, it becomes difficult or impossible to draw the limit between them and the liver. When fluid effusion exists in the pleura, the increased density of the liver still

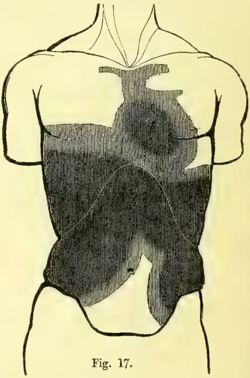

Fig. 17.

Fig. 17. *Hypertrophied liver and spleen in leucocythemia—Enlarged heart.* 1, Hypertrophied heart with dilatation; 2, Great dulness over the larger part of abdomen from enlarged liver on the right side; and enlarged spleen on the left.—(*Partly from Piorry.*)

serves to distinguish it, through the humoral sound of the fluid; and, by changing the position of the patient, its upper edge in the majority of cases may be limited. In cases of ascites, we must lay the patient on the left side, in order to measure the right lobe—on the right side to measure the left lobe, and on the abdomen to percuss it posteriorly. Sometimes the right lobe of the liver is so enormously hypertrophied, that its inferior margin extends to the right iliac fossa (Fig. 17).

When the gall-bladder is much distended with bile, or contains gall-stones to any amount, it may readily be detected by percussion, and the dulness it occasions immediately under the inferior margin of the liver, anteriorly and somewhat laterally, be marked off (Fig. 16, 2).

Spleen.—In percussing the spleen, it is necessary that the patient lie on the right side, and it is advantageous that the examination be made before, rather than after, meals. Anteriorly the sonoriety of the stomach and intestines causes the margin readily to be distinguished. Posteriorly, however, where the organ approaches towards the kidneys, this is more difficult. Its superior and inferior margins may be made out by striking the instrument with some force, and following the rule (No. 10) previously given. This organ offers great resistance on percussion.

In health, the spleen never projects below the false ribs, even during a deep inspiration. Its general size is about four inches long and three inches wide. (Piorry.) In diseased states it may be atrophied or enlarged. I have seen it measure upwards of twelve inches long and eight wide, and it then may project upwards and downwards, as indicated by the dotted lines in Fig. 18. A pleuritic effusion, ascites, pneumonia, or tubercular deposition in the inferior lobe of the left lung, may render a limitation of this organ difficult or impossible. If the dulness cannot be detected, we may infer that its dimensions are small. (Mailliot.)

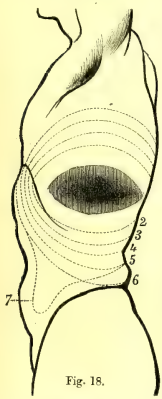

Fig. 18.

Stomach and Intestines.—The sounds elicited by percussion of the stomach and intestines are of the greatest service to the practitioner:—1st, As furnishing him with the means of determining the form of other organs, as the liver, spleen, or bladder; 2dly, As enabling him to distinguish the presence or absence of fœcal or alimentary matter; and, 3dly, As the means of diagnosing abdominal tumours. Hence it is incumbent

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Fig. 18. 1, Slightly enlarged spleen, pushed somewhat upwards. The dotted lines indicate how the organ may be enlarged in various diseases. 7, elongation downwards in leucocythemia.—(*Slightly modified from Piorry.*)

on every physician to be able at once to recognise the difference between the tones furnished by the stomach, small and large intestines, under various circumstances. To arrive at this knowledge, it is necessary to be acquainted with the relative positions of the different abdominal viscera, and the regions of the abdomen to which they correspond. For instance, it is usually the liver and not the stomach that occupies the so called epigastric region just below the end of the sternum. The last-named organ is for the most part situated within the left lower costal walls, just below the heart and the base of the left lung. (Figs. 1 and 2.)

In exploring the abdomen by means of percussion, the pleximeter should first be placed immediately below the xiphoid cartilage, pressed firmly down, and carried along the median line towards the pubes, striking it all the way, now hard, now gently, with the hammer. The different tones which the stomach, colon, and small intestines furnish will thus be distinctly heard. The pleximeter should then be carried laterally, alternately to the one side, and then to the other, till the whole surface be percussed. In this manner, the different tones produced by the cœcum and ascending colon on the right side, as well as by the stomach and descending colon on the left, will be respectively distinguished from that furnished by the small intestines. The sounds and sense of resistance will be modified according as the different viscera are full or empty, as any one can determine on his own body by means of the pleximeter and hammer. When the intestines are full of fluid or solid contents, such portions may be circumscribed and marked out on the surface of the skin. I have thus often succeeded in determining the internal margin of the colon, in its ascending, transverse, or descending portions. Sometimes a portion of intestine is found lying between the abdominal walls and the stomach. The latter, however, may be readily limited, by pressing down the pleximeter, causing the patient to eat or drink, or by examining after dinner. The small intestines are almost never deprived of the tympanitic sound—a circumstance by which they may readily be distinguished from the stomach and large intestines. The distance of any particular knuckle of intestine from the abdominal walls may be pretty accurately calculated by the force necessary to be employed in pressing down the pleximeter, and striking with the hammer, in order to elicit a tympanitic or dull sound.

It is unnecessary to point out the numerous circumstances, and morbid conditions, in which percussion of the abdomen may prove useful in practice. Displacements and variations in size of the stomach or intestines, femoral and scrotal hernia, mesenteric, ovarian, and other tumours, peritoneal adhesions and effusions, may all frequently be diagnosed, and their limits determined, by a careful examination with the pleximeter and hammer. By means of percussion, even the nature of the tumour may often be arrived at; as, for instance, whether it be fungus hematodes, scirrhous, encysted, osseous, etc., by the different degrees of resistance they possess. Care, however, must be taken not to confound with tumours an enlarged spleen or liver, a distended uterus or bladder, stomach full of alimentary matter, etc. It should also be remembered that when the patient lies on his back the percussion sound over the stomach is resonant, but when he stands it is generally dull from the gravitation of the food.

In a practical point of view, it is often useful to determine, by means of percussion, whether an enema or a purgative by the mouth is likely to open the bowels most rapidly. If, for instance, there be dulness in the left iliac fossa, in the track of the descending colon, that part of the intestine must be full of fœces, and an enema is indicated. If, on the other hand, the left iliac fossa sound tympanitic, and the right sound dull, an enema is of little service, as it will not extend to the cœcum, and purgatives, by the mouth are indicated (Figs. 15 and 16).

Effusion of fluid into the peritoneum may be determined with great exactitude by means of percussion, and the height of the fluid marked, as in the case of pleuritic effusion. In the same manner, a change of position furnishes similar results. Abdominal distension from accumulation of air may also be determined. If it be within the intestine, the tympanitic note is partial and limited, if in the peritoneal cavity more equable and diffused (Fig. 19.)

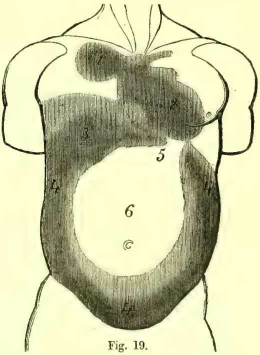

Fig. 19.

Bladder.—This viscus is only to be detected by percussion, when it is more or less distended, and rises above the pubes. It may then be distinguished, and its circular margin limited, by observing the tympanitic sound of the intestines, on the one hand, and the dull humoral sound furnished by the bladder, with increased resistance, on the other. When covered by intestines, it will be necessary to press down the pleximeter with tolerable firmness, but not in such a manner as to give the patient pain. In the infant, the situation of the bladder is not so deep in the pelvis, and a small quantity of fluid renders it cognizable by means of percussion.

A ready approximation of the state of the bladder will be found of

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Fig. 19. *Dropsy of the abdomen, enlarged heart, and aneurism.* 1, Aneurism projecting from the arch of the aorta on the right side; 2, Hypertrophied heart, especially of the right auricle; 3, Liver, pushed upwards; 4, Ascitic fluid, gravitating inferiorly, the patient being on the back; 5 and 6, Stomach and intestines, superiorly and anteriorly.—(*Piorry.*)

great service in cases of fever, apoplexy, delirium, imbecility, paraplegia, etc. etc. In several cases it has been found dangerously distended, on percussing the abdomen to determine the state of the intestines.

I have here only noticed those circumstances in the art of percussion which may be readily accomplished, and which every one may master in a few months by care and attention. For a description of the more delicate points, such as percussion of the kidneys and fœtus, accurately limiting the auricles and ventricles, determining and marking out the ascending and transverse portions of the arch of the aorta, etc., I must refer you to the admirable works of MM. Piorry* and Mailliot.†

AUSCULTATION.

The object of auscultation is to ascertain and appreciate the nature of the various sounds which occur in the interior of the body. It has been found most useful when applied to the pulmonary and circulatory organs. Auscultation of the abdomen is occasionally serviceable, especially in certain cases of pregnancy, and during labour. It has also been applied to the head, although I have never been able to make out any useful results from the practice.

General Rules to be followed in the Practice of Auscultation.

1. Auscultation may be practised directly by applying the ear to the part, or indirectly through the medium of a stethoscope. Generally speaking, direct auscultation answers every necessary purpose except when the surface is unequal, or when it is desirable to limit the sounds to a small region, as during auscultation of the heart. In either of these cases a stethoscope is necessary. The instrument is also useful to confirm or nullify the existence of certain fine sounds which may be detected by the naked ear; to remove the head of the practitioner a respectable distance from the bodies of persons not distinguished for cleanliness; and lastly, as the most delicate method of auscultating the chest anteriorly in women. You should regard the stethoscope as a mere means to an end—that end being, 1st, the education of the ear; and, 2d, a right appreciation of the pathological changes indicated by certain sounds.

2. In the choice of a stethoscope, you should observe, 1st, That the ear-piece fits your own ear; 2d, That the trumpet-shaped extre-

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* De la Percussion Médiate, etc., Paris, 1828. Du Procédé Opératoire, Paris, 1831. De l'Examen Plessimêtrique de l'Aorte Ascendante, et de la Crosse Aortique, etc. Archives Gén. de Méd., vol. ix., 1840, p. 431. On Percussion of the Uterus, and its Results in the Diagnosis of Pregnancy: Monthly Journal, 1846-7, p. 857. Atlas de Plessimêtrisme, Paris, 1851.

† Mailliot (L.) Traité de la Percussion Médiate, etc., Paris, translated into English, with notes, by Dr. George Smith of Madras.

mity is not above an inch and a half in diameter, and is rounded so as not to injure the patient's skin when pressure is made upon it; 3d, That it is light and portable. The instruments recently made of gutta percha fulfil all these conditions.

3. In applying the ear, the surface should be covered only with a smooth piece of linen or a towel. In using the stethoscope, it should be applied to the naked skin, and held steady immediately above the trumpet-shaped extremity by the thumb and index finger, pressed down with tolerable firmness, whilst the second, third, and fourth fingers enable you to ascertain whether the circular edge be perfectly applied, which is absolutely essential.

4. The position of the patient will vary according to the part examined. In auscultating the lungs anteriorly, the erect or recumbent positions may be chosen, when the two arms should be placed in a symmetrical position by the side. If the chest be examined posteriorly, the individual should lean somewhat forward and cross the arms in front. During auscultation of the abdomen, various positions will be required, according as the anterior, lateral, or posterior regions demand investigation. The practitioner, also, should choose such a position as will prevent too much stooping or straining. Generally speaking, the beds in the Infirmary here are too low, and render auscultation very fatiguing to the physician.

5. Whenever individuals are thrown into such a state of agitation as to interfere with the regular action of the heart or lungs, the examination should be deferred until their fear diminishes, or the greatest caution should be exercised in drawing conclusions. Non-attention to this rule has led to many errors.

6. Before examining patients in a hospital, it is necessary that you should have made yourselves perfectly acquainted with the sounds which are continually going on in the healthy body. Omission of this rule not only renders the examination of patients useless, but betrays great want of consideration. For, as it is only from the alterations the healthy sounds undergo, or their being replaced by others, that we draw conclusions, how can this be accomplished if we are ignorant of their character in the first instance? It is expected, therefore, of every examining pupil, that he should be familiar with the character and theory of the various sounds heard in the healthy body before coming to the bedside. This study belongs to the Institutes of Medicine, rather than to that of Clinical Instruction.*

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* Before commencing the actual examination of patients, you should make one or more serious, careful, and prolonged examinations of the chest of one of your fellow-students in private, so as to familiarise your ear with the healthy laryngeal, tracheal, pulmonary, and cardiac sounds, and with the character of the vocal resonance, and of the cough, as heard in various parts of the chest. You should then listen in the same manner to the chest of a young boy of from five to eight years of age, and observe how clear and exaggerated the pulmonary sounds are. Then read the short description of the healthy and morbid sounds which follow, and subsequently consult the more lengthened systematic treatises on this subject.

SPECIAL RULES TO BE FOLLOWED DURING AUSCULTATION OF THE PULMONARY ORGANS.

1. In listening to the sounds produced by the action of the lungs, we should pay attention to three things: 1st, The natural respiration; 2d, The forced or exaggerated respiration; and, 3d, The vocal resonance. For this purpose, having listened to the sounds during ordinary breathing, we direct the patient to take a deep breath, and then, still listening, we ask him a question, and during his reply judge of the vocal resonance.

2. You should commence the examination immediately under the centre of one clavicle; and having ascertained the nature of the sounds and vocal resonance there, you should immediately listen in exactly the corresponding spot on the opposite side. The examination should be continued alternately from one side to the other, in corresponding places, until the whole anterior surface of the chest is explored. The posterior surface is then to be examined in like manner.

3. When in the course of the examination, anything different from the normal condition is discovered at a particular place, that place and the parts adjacent should be made the subject of special examination, until all the facts regarding the lesion be ascertained.

4. It is occasionally useful to tell the patient to cough, in which case we are enabled to judge,—1st, Of forced inspiration, as it precedes the cough; and, 2d, Of the resonance which the cough itself occasions.

OF THE SOUNDS ELICITED BY THE PULMONARY ORGANS IN HEALTH AND IN DISEASE.

I am anxious to impress upon you, that the sounds which may be heard in the lungs are like nothing but themselves. Students are too apt to take up erroneous notions from reading on this subject, and, instead of listening to the sound actually produced, fatigue themselves in a vain endeavour to hear something like the crackling of salt, the rubbing of hair, foaming of beer, or other noises to which these sounds have been likened. Preconceived notions frequently oppose themselves to learning the truth, and have to be got rid of before the real state of matters can be ascertained. Hence the great importance of deriving your first impressions of the sounds to be heard by auscultation, not from books or lectures, but from the living body itself.

If you listen through your stethoscope, placed over the larynx and trachea of a healthy man, you will hear two noises,—one accompanying the act of inspiration, and the other that of expiration. These are called the *laryngeal and tracheal sounds or murmurs.* If you next place your stethoscope a little to the right or left of the manubrium of the sternum, you will hear the same sounds diminished in intensity. These are the *bronchial sounds or murmurs.* If now you listen under and outside the nipple on the right side, or posteriorly over the inferior lobe of either lung, you will hear two very fine murmurs. That accompanying the inspiration is much more distinct than that accompanying the expiration. By some, on account of its excessive fineness, it is stated that there is no expiratory murmur in health; but this is incorrect. These sounds, then, are the *vesicular respiratory murmurs.* All these sounds become exaggerated during forced respiration, but in a state of health they never lose their soft character. Again, if you listen in the same places, whilst the individual speaks, you will hear a peculiar resonance of the voice, which has been called, in the first situation, *pectoriloquy ;* in the second *bronchophony ;* while in the third it is scarcely audible. A knowledge of these circumstances, and a capability of appreciating these sounds, are necessary preliminary steps to the right comprehension and detection of the murmurs which may be heard during disease.

I have to suppose, then, that you have made your ears familiar with these sounds, and that you are acquainted with the present state of theory regarding their formation. This last may be stated in very few words to be, that the respiratory murmurs are occasioned by the vibration of the tubes through which the air rushes, according to well-known acoustic principles. Hence they are loudest in the trachea, finer in the large bronchi, and finest in their ultimate ramifications. The vocal resonance, on the other hand, originates in the larynx; and diminishes or increases—1st, According to the distance of any point from the source of the sound; and, 2d, According to the power which the textures have in propagating it.

If now you examine, in succession, any six of the cases in the wards which are labouring under well-marked pulmonary diseases, you will have no difficulty in recognising that all the sounds you hear may be classified into two divisions: 1st, Alterations of the natural sounds; 2d, New, or abnormal sounds, never heard during health.

I. Alterations of the Natural Sounds.—All the sounds of which we have spoken, and which can be heard in the lungs during health, may, in certain diseased conditions, be increased, diminished, or absent; their character or position may be changed; and with regard to the respiratory murmurs, they may present alterations in rhythm or duration with respect to each other.

Alterations in Intensity. — Some persons have naturally louder respiratory murmurs than others; if this occur uniformly on both sides, it is a healthy condition. Occasionally, however, the sounds are evidently stronger in one place, or on one side *(puerile respiration)*, generally indicating increased action of the lung, supplementary to diminished action in some other part. In the same manner, there may be feeble respiration simply from diminished action, as in feeble or old persons; but it may also be occasioned by pleurodynia, obstructions in the larynx, trachea, or bronchi—pleurisy, or pulmonary emphysema, or exudations filling up a greater or less number of the air-cells and smaller tubes, as in pneumonia, phthisis, etc. Complete absence of respiration occurs where there is extensive pleuritic effusion or hydrothorax.

Alterations in Character.—The various respiratory murmurs may, in certain conditions of the lung, assume a peculiar harshness, which, to the ear of the practised auscultator, is a valuable sign, indicative of altered texture. Thus, in incipient phthisis, the vesicular murmur under the clavicle is often *rude* or *harsh.* In pneumonia the bronchial respiratory murmur presents a similar character. When ulceration exists, it becomes what is called *cavernous* (hoarse or blowing); and in certain cases of pneumothorax with pulmonary fistula, it assumes an *amphoric* character.

Alterations in Position.—It frequently happens that the sounds which are natural to certain parts of the chest, are heard distinctly, where in health they are never detected. Thus, in pneumonia, *bronchial*, or *tubular breathing*, as it is sometimes called, may be evident, where only a vesicular murmur ought to exist. This is often well marked with regard to the vocal resonance, as certain lesions, which occasion condensation or ulceration, will enable us to hear either bronchophony or pectoriloquy in parts where, under ordinary circumstances, no voice can be heard.

Alterations in Rhythm.—In health, the inspiration is usually three times as long as the expiration. In certain diseased conditions this relation is altered, or even inverted. In incipient phthisis we often find the expiration unnaturally prolonged. In chronic bronchitis and emphysema it is three or four times longer than the inspiration.

II. New or Abnormal Sounds.—These are of three kinds: 1st, Rubbing or friction noises; 2d, Moist rattles; 3d, Vibrating murmurs.

1. *Rubbing or Friction Noises* are caused in the pulmonary apparatus by some morbid change in the pleuræ, whereby, instead of sliding noiselessly on one another, they emit a rubbing sound. This may be so fine as to resemble the rustling of the softest silk, or so coarse as to sound like the creaking of a saddle, grating, rasping, etc.; and between these two extremes you may have every intermediate shade of friction noise. This variation in sound is dependent on the nature of the alteration which the pleuræ have undergone. If covered with a softened thin exudation, the murmur will be soft; if it be tougher and thicker, the sound will be louder; if hard, dense, and rough, it will assume a creaking, harsh, or grating character, etc. etc. These noises are heard in the various forms of pleurisy.

2. *Moist Rattles* are produced by bubbles of air traversing or breaking in a somewhat viscous fluid. This may occur in the bronchi, when they contain liquid exudation, mucus, or pus, or in ulcers of various sizes. They may be so fine as to be scarcely audible (when they have been called *crepitating*), or so coarse as to resemble gurgling or splashing, when they have received the name of *cavernous.* Here

again, between these two extremes, we may have every kind of gradation, to which auscultators have attached names, such as *mucous*, *submucous*, *subcrepitating*, etc. etc. With these names you need not trouble yourselves; all that it is important for you to determine is, that the sound be *moist*, and you will easily recognise that the rattles are coarse or large, in proportion to the size of the tubes or ulcers in which they are produced, and the amount of fluid present. These rattles may be heard in pneumonia, phthisis, pulmonalis, bronchitis, pulmonary apoplexy, etc. etc.

3. *Dry Vibrating Murmurs* arise when the air-tubes are obstructed, constricted, or lose their elasticity and become enlarged, whereby the vibrations into which they are thrown by the column of air, produce sounds or tones of an abnormal character. Hence murmurs may be occasioned of a fine squeaking (*sibilous murmur*), or of a hoarse snoring character (*sonorous murmur*), and between the two extremes, there may be all kinds of variations, to which ingenious people have applied names. These only cause confusion; all that is necessary, being to ascertain that the murmur is *dry*, and you will readily understand that the fineness or coarseness of the sound will depend on the calibre of the tube or cavity thrown into vibrations. They are usually heard in cases of bronchitis and emphysema. Occasionally they present a blowing character, as when ulcers are dry, which often occurs in phthisis.

The *vocal resonance*, besides undergoing the changes already noticed in intensity, character, and position, may give rise to abnormal sounds. Occasionally it presents a soft reverberating or trembling noise, like the bleating of a goat (*œgophony*). The value of this sign, as indicative of pleurisy, was much overrated by Laennec. At present it is little esteemed. Sometimes the resonance gives rise to a *metallic tinkling*, a noise similar to that caused by dropping a shot into a large metallic basin, or the note produced by rubbing a wet finger round the edge of a tumbler or glass vessel. This is often best heard immediately after a cough in certain cases of chronic phthisis. Œgophony is supposed to be produced when a thin layer of serous fluid between the pleuræ is thrown into vibrations. The cause of metallic tinkling has created great discussion, and is not yet ascertained.

Such, then, are the principal sounds which may be heard by auscultation of the pulmonary organs in health and during disease. Many writers have endeavoured to point out their diagnostic importance, and drawn up rules which have always appeared to me much too arbitrary. Indeed, in so far as the education of medical students is concerned, I have long been persuaded that the study of these rules has retarded their powers of diagnosis, and afterwards led to dangerous errors in practice. I know of no dogma, for instance, more mischievous than the one which asserts a crepitating (that is a fine moist) rattle to be pathognomonic of pneumonia, because it is just as common in phthisis, and is frequently heard in various other lesions of the pulmonary organs. Hence we should regard a crepitating rattle, not as distinctive of this or that so-called disease, but simply of fluid in the smaller air-passages, and an increased resonance of the voice, as indicating hollow spaces with vibrating walls, or increased induration of the pulmonary textures, and not as diagnostic of phthisis, pneumonia, and so on. I wish, then, strongly to impress upon you,—

1st, That the different sounds are only indicative of certain physical conditions of the lung, and in themselves bear no fixed relation to the so-called diseases of systematic writers.

2d, No single acoustic sign, or combination of signs, is invariably pathognomonic of any certain pathological state,—and conversely, there is no pathological state which is invariably accompanied by any series of physical signs.

3d, Auscultation is only *one* of the means whereby we can arrive at a just diagnosis, and should never be depended on alone.

Special Rules to be followed during Auscultation of the Circulatory Organs.

1. In listening to the sounds produced by the action of the heart and arteries, we should pay attention—1st, To the impulse; 2d, To the character and rhythm of the sounds; 3d, To the place where they are heard loudest, and the direction in which they are propagated.

2. You should commence the examination by feeling for the spot where the apex of the heart beats against the walls of the chest, which will enable you to judge of the impulse. This ascertained, place your stethoscope immediately over it, and listen to the sounds. Then place the instrument above, and a little to the inside of, the nipple, near the margin of the sternum, and listen to the sounds there. In the one situation you will hear the first or systolic sound, in the other the second or diastolic sound loudest.

3. If anything different from the normal condition be discovered in either one or the other position, or in both, they should be again carefully examined, and by moving the stethoscope below and round the apex of the heart, or above, in the course of the aortic arch or carotids, on the right and left side, etc. etc., it should be ascertained at what point, or over what space, the abnormal sounds are heard loudest, and whether they be or be not propagated in the course of the large vessels. Occasionally listening over the back and in the course of the descending aorta may be useful.

4. When, during the above examination, we discover a new source of impulse and of sound in one of the large vessels, this must be especially examined, the limits of such impulse and sound carefully ascertained—whether they be or be not synchronous with those originating in the heart—their direction, etc.

5. Under ordinary circumstances, the respiratory do not interfere with the detection of the cardiac sounds; but where the former are

very loud and the latter indistinct, it is useful to direct the individual to hold his breath for a few moments. Sometimes the impulse and sounds of the heart are heard better by directing the patient to lean forward; they may also, if necessary, be exaggerated and rendered more distinct by directing him to walk up and down quickly, or to make some exertion for a short time.

OF THE SOUNDS ELICITED BY THE CIRCULATORY ORGANS IN HEALTH AND DISEASE.

On placing your ear over the cardiac region in a healthy person, you will feel a beating, and hear two sounds, which have been likened to the tic-tac of a watch, but to which they bear no resemblance. They may be imitated, however, very nearly, as pointed out by Dr. Williams, by pronouncing in succession the syllables *lupp*, *dupp*. The first of these sounds, which is dull, deep, and more prolonged than the second, coincides with the shock of the apex of the heart against the thorax, and immediately precedes the radial pulse; it has its maximum intensity over the apex of the heart—below and somewhat to the inside of the nipple. The second sound, which is sharper, shorter, and more superficial, has its maximum intensity nearly on a level with the third rib, and a little above and to the right of the nipple—near the left edge of the sternum. These sounds, therefore, in addition to the terms first and second, have also been called inferior and superior, long and short, dull and sharp, systolic and diastolic—all which expressions, so far as giving a name is concerned, are synonymous.

The two sounds are repeated in couples, which, if we commence with the first one, follow each other with their intervening pauses, thus—1st, There is the long dull sound coinciding with the shock of the heart; 2d, There is a short pause; 3d, The short sharp sound, and 4th, A longer pause,—all which correspond with one pulsation. In figures, the duration of these sounds and pauses by some have been represented thus,—the first sound occupies a third, the short pause a sixth, the second sound a sixth, and the long pause a third. Others have divided the whole period into four parts; of which the two first are occupied by the first sound, the third by the second sound, and the fourth by the pause. The duration, as well as the loudness, of the sounds, however, are very variable even in health, and are influenced by the force and rapidity of the heart's action, individual peculiarity, and form of the thorax. Their extent also differs greatly. They are generally distinctly heard at the precordial region, and diminish in proportion as we withdraw the ear from it. They are less audible anteriorly on the right side, and still less so posteriorly on the left side. On the right side posteriorly they cannot be heard. Their tone also varies in different persons; but in health they are free from a harsh or blowing character.

Great diversity of opinion has existed regarding the causes of these sounds—all of which you will of course have heard discussed before coming here. You must never forget, however, the cardiac actions which coincide with them ; for our reasoning from any changes we may detect, will entirely depend upon our knowledge of these. We may consider, then, that there coincides with the first sound—1st, The impulse, or striking of the apex against the thoracic walls ; 2d, Contraction of the ventricles ; 3d, Rushing of the blood through the aortic orifices ; and 4th, Flapping together of the auriculo-ventricular valves. There coincide with the second sound—1st, Rushing of the blood through the auriculo-ventricular valves ; and 2d, Flapping together of the aortic valves. Contraction of the auricles immediately precedes that of the ventricles. The result of numerous pathological observations, and of many experiments, is, that in health the first sound is produced by the combined action of the auriculo-ventricular valves, of the ventricles, and of the rushing of the blood, which sound is augmented in intensity by the impulsion of the heart's apex against the thorax ; whereas the second sound is caused only by the flapping together of the sigmoid valves.

With the cardiac as with the respiratory sounds, the alterations which take place during disease may be divided into—1st, Modification of the sounds heard in health ; 2d, New or abnormal sounds.

I. Modifications of the Healthy Sounds.—These refer to the variations the healthy sounds present in their seat, intensity, extent, character, and rhythm.

Seat.—The sounds may be heard at their maximum intensity *lower* than at the points previously indicated, as in cases of dilated hypertrophy of the left ventricle, enlargement of the auricles, or of tumours at the base, depressing the organ. They may be *higher*, owing to any kind of abdominal swelling pushing up the diaphragm. They may be more on *one side* or the other, in cases where the heart is pushed laterally by effusions of air or fluid in a pleural cavity. Various other circumstances may also modify their natural position, such as tumours in the anterior or posterior mediastinum, aneurisms of the large vessels, adhesions of the pericardium, deformity in the bones of the chest, etc. etc.

Intensity and Extent.—These are *diminished* in cases where the heart is atrophied or softened ; when there is pericardial effusion, concentric hypertrophy of the left ventricle, or emphysema at the anterior border of the left lung. They are *increased* in cases of dilated hypertrophy, of nervous palpitations, and when neighbouring portions of the lung are indurated, especially in certain cases of pneumonia and phthisis pulmonalis.

Character.—The sounds become *clearer* or *duller* than usual, according as the walls of the heart are thinner or thicker. Occasionally they sound *muffled* in cases of hypertrophy or softening of the muscular walls. Not unfrequently there is a certain degree of *roughness*, which is difficult to determine as being healthy or morbid. Occasionally it ushers in more decided changes; at others, continues for years without alteration. These alterations in character are distinguished by some auscultators as variations in the *tone* of the sounds.

Rhythm or Time.—I need not say that the frequency of the pulsations differs greatly in numerous affections altogether independent of any special disease in the heart. In certain cardiac affections, however, the beats are *intermittent*, in others *irregular*—that is, they succeed each other at unexpected intervals. The *number* of the sounds also varies. Sometimes only one can be distinguished, it being so prolonged as to mask the other. Occasionally three or even four sounds may be heard, depending either on reduplication in the action of the valves when diseased, or on want of synchronism between the two sides of the heart. Not unfrequently the increased and irregular movements of the organ, combined with the sounds, are of such a character as to receive the name of *tumultuous.*

II. New or Abnormal Sounds.—These are of two kinds: 1st, Friction murmurs; 2d, Blowing or vibrating murmurs. Dr. Latham has called them *exocardial* and *endocardial.* I am in the habit of denominating them *pericardial* and *valvular.*

Pericardial or Friction Murmurs.—These murmurs are the same in character, and originate from the same causes, as the friction noises connected with the pulmonary organs. It is only necessary to observe, that occasionally they are so soft as closely to resemble blowing murmurs, from which they are only to be distinguished by their superficial character and limited extent.

Valvular or Vibrating Murmurs.—These murmurs vary greatly in character; some being so soft as to resemble the passage of the gentlest wind; others are like the blowing or puff from the nozzle of a bellows (*bellows murmurs*)*;* whilst others are harsher, resembling the noise produced by *grating*, *filing*, *sawing*, etc. They are all occasioned, however, by diseases interfering with the functions of the valves. Sometimes these do not close, and the blood consequently regurgitates through them; at others, whilst this is the case, they are constricted, indurated, roughened, and even calcareous—whence the harsher sounds. They may be single or double, and have their origin either in the auriculo-ventricular or arterial valves, or in both at once, the detection of which constitutes the diagnosis of the special diseases of the organ. Occasionally these sounds resemble *musical notes*, more or less resembling the cooing of a dove, singing or twittering of certain small birds, whistling, tinkling, etc. etc. These depend either upon excessive narrowing of the orifices, or upon any causes which induce vibrations of solids in the current of blood—as, when there are perforations in the valves, irregularities of their margins, string-like or other shaped exudations on their surface, etc. etc.

Auscultation of the Abdomen.

On applying the stethoscope over the stomach and intestines in a healthy state, various gurgling and churning noises may be heard. In the former they may assume an amphoric or metallic character, in the latter they are called *borborygmi.* They are caused by the displacements of gas and water, and are most audible during the period of digestion, and the action of a purgative or enema. The impulse of the aorta can be detected especially in thin subjects, when the pressure of the stethoscope may often be made to elicit a blowing sound.

In disease these sounds may be increased or diminished, and in addition, there may be present various kinds of friction or grating sounds when the surface of the peritoneum is roughened, owing to exudation or the unequal pressure of tumours. These last may also give rise to blowing murmurs, when it often becomes difficult to determine whether the morbid sound originates in the tumour itself, or from the pressure it exercises on the aorta. In cases of doubtful pregnancy, the marked rapidity of the fœtal pulse contrasted with that of the individual examined, constitutes a positive sign.

Auscultation of the Large Vessels.

On listening through the stethoscope placed over the arteries in the neighbourhood of the heart, we hear the same sounds as are produced at the sigmoid valves, propagated along its course, but more indistinct as we remove the instrument from the base of the heart. Those which are more distant have only one sound, which is synchronous with their impulse and their dilatation. This sound is of a dull character, but in health always soft.

In the various conditions of disease we have a single or double bellows sound, or it may be harsh, grating, rasping, etc. In the first place, you must ascertain whether any of these sounds are propagated along the artery from the heart, which you will know by listening over its course from that organ, and observing whether they increase as you proceed towards it. If the sound have an independent origin, it may originate from disease of the internal surface of the artery, when it will be harsh in proportion to the roughness; from stricture of, or pressure on the vessel, or from its dilatation. Generally speaking, the more dilated and superficially seated the vessel is, the sharper is the sound. Sometimes there is a double murmur in the course of a vessel, having an undoubted independent origin. This is most common in cases where there is an aneurismal pouch, into which the blood passes in and out through an opening narrower than the swelling itself. Occasionally one or both such murmurs may possess somewhat of a metallic ringing, or even musical character, when the margins of the opening are probably tense, and thrown into peculiar vibrations.

Not unfrequently a soft systolic blowing is audible at the base of the heart, or over the carotids and deep jugular vein. At other times it is continuous, resembling humming, or the noise of a Parisian toy called *le diable.* These murmurs are distinguished from valvular ones —1st, By being systolic at the base of the heart; 2d, By their softness; 3d, By not being permanent; and, 4th, By occurring in anemic or debilitated persons, and especially in young girls.

I have already told you never to form a conclusion from auscultation alone. Even when combined with percussion, it is not safe to form a diagnosis without a knowledge of *all* the circumstances of the case. Hence why I repudiate those rules which have been published in books, that have for their object the establishment of opinions from physical signs alone. At the same time, there can be no doubt that percussion and auscultation are absolutely essential to the proper investigation of maladies, although not more so than other modes of inquiry. I have, therefore, thought it best to give you a condensed resumé of the sounds which may be heard by auscultation of the lungs, heart, abdomen, and large vessels; pointing out a few of the diseased states in which they may be sometimes (not always) heard, and especially indicating the physical conditions on which they are supposed to depend. Their true diagnostic value can only be learned by the careful examination of individual cases.

USE OF THE MICROSCOPE.

A knowledge of the ultimate structure of the human body, in its healthy and diseased conditions, is now so advanced as to necessitate the introduction of the microscope among the instruments of the medical practitioner. You must not suppose that an additional method of gaining information implies abandonment of those, the utility of which has stood the test of experience. Men must learn the everyday use of their senses; must know how to feel, hear, and see, in the same manner as they did before instruments were invented. We don't see the stars less clearly with our naked sight, because the telescope is necessary for an astronomer. Neither should a physician observe the symptoms of a disease less accurately because he examines the chest with a stethoscope, or a surgeon be less dexterous with the knife, because it is only by means of the microscope he can determine with exactitude the nature of a tumour. But it is unnecessary to enter into a lengthened argument to prove that the science and art of medicine are greatly indebted, in modern times, to the invention and proper application of ingenious instruments. The following examples will serve to convince you that the microscope is one of these :—

Example 1.—Some years ago I was summoned to see a Dispensary patient labouring under bronchitis, who was spitting florid blood. On examining the sputum with a microscope, I found that the coloured blood corpuscles were those of a bird. On my telling her she had mixed a bird's blood with the expectoration, her astonishment was unbounded, and she confessed that she had done so for the purpose of imposition.

Example 2.—A gentleman, for some years, had laboured under a variety of anomalous symptoms, referable to the head and digestive systems, under which he had become greatly reduced. He had consulted many practitioners, and visited innumerable watering places, in a vain search after health. On examining the urine with a microscope, I found it crowded with spermatozoa. He evidently laboured under spermatorrhœa, a disease which had never been suspected, but which was readily cured on the employment of an appropriate treatment.

Example 3.—A boy was brought to me with an eruption on the scalp, which was of so indefinite a character that its nature could not be determined. He had lately been elected to occupy a vacancy in one of our charitable educational establishments, and the question to decide was, whether the disease was or was not contagious. On examining the scab with a microscope, I readily discovered the *Achorion Schoenleini*, or fungus constituting true favus; and as this has been experimentally proved to be inoculable, I had no hesitation in preventing his admission to the school.

Example 4.—A child was supposed to be affected with worms, because it passed in abundance yellowish shreds, which, to the naked eye, closely resembled ascarides. All kinds of vermifuge remedies had been tried in vain. On examining the shreds with a microscope, I found them to consist of the undigested spiral vessels of plants; and they ceased to appear when the vegetable broth used as food was abandoned.

Example 5.—I was called to see an infant, a month old, which was in a state of considerable emaciation, with constant diarrhœa. The mother, however, maintained that her milk was abundant, and that it was taken in sufficient quantity. On being examined with a microscope, it was found to contain numerous compound granular bodies, and comparatively few milk globules. In short, it presented, in an exaggerated degree, all the characters of colostrum, and this thirty days after delivery. It was evident, then, that the *quality* of the milk was in fault, an opinion which was confirmed by the recovery of the infant, when a healthy nurse was procured.

Example 6.—An individual was supposed to be labouring under dysentery, from the frequent passage of yellowish pulpy masses in the stools, accompanied with tormina and other symptoms. On examining these masses with the microscope, I found them to consist of undigested potato skins. On inquiry, it was ascertained that this person had eaten the skins with the potatoes. On causing these to be removed before dinner, the alarming appearance ceased, and the other symptoms also disappeared.

Example 7.—An elderly lady conceived herself to be affected with insects continually forming in the skin, which produced incessant itching and tingling. All the hair was removed, and every kind of application, including mercurial preparations, were tried without effect. On rubbing the surface, she always saw minute white rolls and black specks, which she regarded as insects in different stages of development. The torment and anxiety this caused her for many months it is scarcely possible to conceive. At length she laboured under the idea that she was communicating the disease to her husband and daughter, when, at the request of her medical attendant in the west of Scotland, she came to Edinburgh, in order that I might investigate and treat it. I had the pleasure of shewing this lady, under the microscope, that the white bodies were minute rolls of epidermis or of the cotton cloth with which she rubbed the skin, and that the black specks were portions of dust or soot. Her hallucination being in this way dissipated, she returned home perfectly well.

Example 8.—A child had been suffering for four years from copious and fœtid discharge from the nostrils, accompanied with great pain. At the end of that time, a dark brown and indurated mass was discharged about an inch long, and a quarter of an inch broad, closely resembling a sequestrum of bone. This mass I was requested to examine microscopically by Dr. Littlejohn, whose case it was, and from its structure I readily determined that it consisted of some fir wood. When this was known, the parents remembered that, about the time the disease commenced, alterations were made in the house, and that the children used to play with the wood shavings. There could be little doubt that a piece of shaving had been thrust up the nose, and been the cause of all the symptoms.

Examples of this kind could be readily multiplied. No doubt mistakes will be made with this instrument in the hands of inexperienced persons, in the same manner as the use of the stethoscope, or of a scalpel, may lead to a false conclusion, or to an accident. But this, so far from being an argument opposed to their employment, only proves the necessity of becoming more skilful in their use. Certainly there is none which requires more expert management in itself, or more caution in drawing conclusions from its employment, than the microscope.

Description of the Microscope.

It is not my intention to enter upon a description of the optical principles on which microscopes are constructed, although you will find a knowledge of these very useful. I shall suppose that you are desirous of obtaining an instrument that will answer all the purposes of the anatomist and physiologist, as well as afford you every possible assistance in the way of diagnosis as medical men. For this purpose, you should learn to distinguish what is necessary from what is unnecessary, in order that you may procure the former in as convenient a form, and at as moderate a cost as possible.

A microscope may be divided into mechanical and optical parts. The former determine its general form and appearance. Of the numerous models which have been invented, the one here figured, exactly one fourth its real size, appears to me the most useful for all the purposes of the physiologist and medical practitioner. The body consists of a telescope tube, eight inches in length, held by a split tube, three inches long. It may be elevated and depressed with great readiness by a cork-screw movement, communicated to it by the hand, and this constitutes the coarse adjustment. It is attached to a cross bar and pillar, at the lower portion of which last, very conveniently placed for the hand of the observer, is the fine adjustment. The stage is three inches broad, and two and a half inches deep, strong and solid, with a circular diaphragm below it. The base of the instrument is heavily loaded with lead to give it the necessary steadiness.

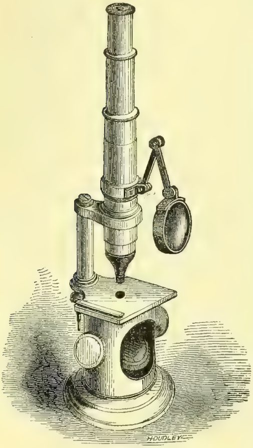

Fig. 20.

This form of microscope possesses all the mechanical qualities required in such an instrument. These are—1st, Steadiness; 2d, Power of easy adjustment; 3d, Facility for observation and demonstration; and, 4th, Portability.

1. *Steadiness.*—It must be evident that if the stage of the microscope possesses any sensible vibration, minute objects, when magnified highly, so far from being stationary, may be thrown altogether out of the field of view. Nothing contributes more to the comfort of an observer than this quality of a microscope, and great pains have been taken to produce it. In the large London instruments this end has been admirably attained, but at so much cost and increase of bulk as to render it almost useless. In the small model I have recommended, all the steadiness required is present in the most convenient form.

2. *Power of Easy Adjustment.*—It is a matter of great importance to those who use the instrument much, and work with it for hours together, that the adjustment should work easily and rapidly, and be placed in convenient situations. Nothing can be more commodious than the manner in which these ends are arrived at in the model

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Fig. 20. Oberhaeuser's model, made at my suggestion for medical men, $\frac{1}{4}$th real size.

figured. By insertion of the body of the instrument within a split tube, you may, by a spiral movement, elevate and depress it with the greatest rapidity, and even remove it altogether if necessary. The necessity of continually turning the large screws affixed to most microscopes, becomes fatiguing in the extreme. Then the fine adjustment, placed conveniently behind the microscope, near the hand which rests on the table, is in the very best position; whereas, in some London instruments, it is placed on the top of the pillar, so that you must raise your hand and arm every time it is touched. In other London instruments, it is placed in front of the body, so that you must stretch out the arm and twist the wrist to get at it. No one could work long with so inconvenient a contrivance.

3. *Facility for Observation and Demonstration.*—For facility of observation and demonstration, it is necessary that the instrument should be of a convenient height, and that the stage on which the objects are placed should be easily accessible. Here, again, nothing can be more commodious than the microscope I have recommended, for, when it is placed on a table, its height is almost on a level with the eye, and we can look through it for hours without the slightest fatigue. On the other hand, the stage is elevated, just so much as enables the two hands, resting on their external edges, to manipulate with facility all kinds of objects placed upon it. The large London instruments are so high as to render it necessary to stand up to see through them. To obviate this disadvantage, a movement is given to the body, by which it can be depressed to any angle. But this movement renders the stage oblique, and removes it to a distance, where it becomes very inconvenient to manipulate on its surface. To obviate this difficulty, the stage itself has been rendered moveable in various ways by different screws, so that in this way complexity has been added to complexity, until a mass of brass work and screws is accumulated, to the advantage of the optician, but to the perplexity and fatigue of the observer. But by no contrivance is it possible to avoid the aching arms which such a position of the stage invariably produces in those who work with such a cumbrous machine for any length of time.

4. *Portability.*—This is a property which should by no means be overlooked in instruments that are intended more for utility than ornament. A medical man is often called upon to verify facts in various places; at his own house, at an hospital, at the bed-side of his patient, or at a private post-mortem examination. It is under such circumstances that the value of portability is recognised. The large London instruments require an equipage or a porter to transport them from place to place; even the putting them in and out of the large boxes or cabinets that are built around them, is a matter of labour. In short, notwithstanding the splendour of the screws, the glittering of the brass, and the fine workmanship, there can be little doubt that, on the whole, they are very clumsy affairs.

There are many occasions on which a medical man may find it useful to carry a microscope with him, especially in the case of post-mortem examinations. Many attempts have been made to construct a pocket

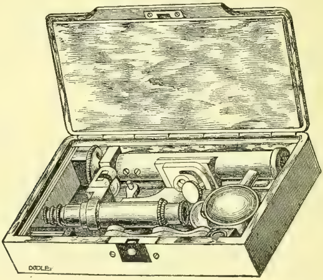

Fig. 21.

microscope; and for the purposes above alluded to, I myself caused one to be constructed some years ago, which, with its case, resembled a small pocket telescope. Dr. Gruby of Paris, however, has planned

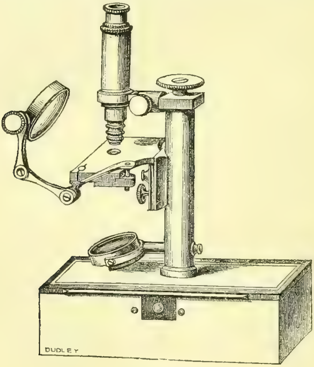

Fig. 22.

the most ingenious instrument of this kind, which possesses most of the properties we have enumerated, and will be found very useful for

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Fig. 21. Gruby's compound pocket microscope, exactly one-half the real size.
Fig. 22. The same microscope mounted, ready for use.

those accustomed to microscopic manipulation. It is contained in a case, the size of an ordinary snuff-box, and possesses all the conveniences of the larger instruments, with various lenses, a micrometer, slips of glass, needle, knife, and forceps, in that small compass. The prefixed woodcuts, exactly one-half the real size, will give an idea of this ingenious microscope, manufactured by Brunner of Paris. For a more minute description, I must refer you to the "Monthly Journal of Medical Science" for December 1846.

There is a general feeling among the public that the larger a microscope is, the more it must magnify; but I need not tell you this is error. A very imposing mass of brass work and mechanical complexity, is no guarantee that you will see objects better, or, what is of more consequence, become good observers. On the contrary, the more unwieldy the instrument, the less disposed will you be to use it. Besides, the habitual employment of artificial methods of moving about the object, as by the screws of a moveable stage, will prevent your acquiring that dexterous use of your fingers and accuracy of manipulation which are at all times so useful. Nothing, indeed, can be more amusing than to see a man twisting his screws, pushing his heavy awkward stage about, and laboriously wasting time to find a minute object which another can do in a moment, and without fatigue, by the simple use of his fingers. But perhaps you will consider the weightiest objection to the large instruments is the expense they necessitate,—the cost being necessarily in proportion to the amount of brass and mechanical labour employed upon them. If, then, you have to choose between a complex model and a simple one, I strongly advise you, as a matter of real economy, to choose the latter. Indeed the former, to a practical histologist, is worthless.

We have next to speak of the optical parts of microscopes, which are certainly much more important than the mechanical ones—everything depending upon obtaining a clear and distinct image of the object examined. Under this head we may describe the objective, the eyepiece, and methods of illumination.

1. *The Objective, or series of Achromatic Lenses*, is that part of the optical portion of a microscope which is placed at the bottom of the tube or body, and is near the object to be examined. This may be considered the most important part of the instrument, and the greatest pains have been taken by all opticians in the manufacture of good lenses. It is here I consider that the London opticians are pre-eminent, for I am not aware that in any part of the world such perfect objectives have been manufactured as the eighth of an inch by Smith, the twelfth of an inch by Ross, and the sixteenth of an inch by Powell. But when we come down to the one-fourth of an inch, which is by far the most useful objective for anatomical and medical purposes, the superiority of the London opticians is very slight, if any. At this magnifying power the compound lenses of C. Chevalier, Oberhaeuser, Brunner, and Nachet of Paris; Schiek and Pistor of Berlin; Frauenhofer of Munich, and

Ploesl of Vienna, may be employed with the greatest confidence, and it may be said that by far the largest number of important discoveries in science have been made through their employment. The Parisian lenses, in addition, have one great advantage, namely, their cheapness.

The London opticians have succeeded in combining the lenses of their objectives, so as to obtain a large field of vision, with as little loss of light as possible. These qualities are valuable in the lower magnifying lenses during the examination of opaque objects, and in the higher ones when observing transparent objects by transmitted light. But in the lenses of medium power, such as the one-fourth of an inch, the amount of light is so great as to be almost a defect. Notwithstanding careful management of the mirror and diaphragm, the field of vision is often dazzling, and always presents a glare most detrimental to the eyes of the observer. I cannot employ Ross's fourth of an inch for fifteen minutes without feeling intense headache, and I know of more than one excellent observer in whom the sight has so much suffered from this cause as to incapacitate them from continuing their researches. In the same manner, the lenses of Brunner and Nachet give rise to a yellow light highly disagreeable; while those of Oberhaeuser, Schiek and Pistor, and Frauenhofer (with Amici's and Ploesl's I am not familiar), present a pale blue light, most pleasant to work with, and which may be gazed at for hours without fatiguing the eye.

For the above reasons, as well as from considerable experience in the use of many kinds of microscopes by different manufacturers, I am satisfied that the best lens you can employ for ordinary purposes is Oberhaeuser's No. 7, which corresponds to what is called in England the quarter of an inch. For low powers you may have Oberhaeuser's No. 3, or the one inch lens of the London opticians. For all the wants of the medical man these will be sufficient. The anatomist may occasionally require a higher lens, as during the examination of the ultimate fibrillæ of muscle, when the eighth, twelfth, or sixteenth of an inch of the London opticians may be procured. All these lenses may be attached to the model we have recommended by means of a brass screw made on purpose.

2. *The Eye-piece.*—This is that portion of the optical apparatus which is placed at the upper end of the tube or body, and is near the eye of the observer. While the objective magnifies the object itself, the eye-piece only magnifies the image transmitted from below. Hence, as a source of magnifying power, it is inferior to the lens; and when this possesses any defects, these are enlarged by the eye-piece. Two eye-pieces are all that is necessary with the model I have recommended, and those of Oberhaeuser, called Nos. 3 and 4, are the most useful for the medical man.

3. *Methods of Illumination.*—There are few things of more importance to the practical histologist than the mode of illumination. This is accomplished—1st, By transmitted light; 2d, By reflected light; and 3d, By achromatic light.

Transmitted light is obtained by means of a mirror placed below the object, which, to be seen, must therefore be transparent. In large microscopes the mirrors are provided with universal joints, so that they may easily be turned in any direction. Below the stage every microscope should possess a diaphragm pierced with variously sized holes, whereby the amount of light furnished by the mirror may be moderated. In Oberhaeuser and Nachet's instruments the smallest aperture should be employed for the higher objective. It is also useful in the examination of many objects that the light should be directed upon them sideways; this may be done by the diaphragm, or by the mirror, and, in the small model formerly figured, is admirably attained by simply turning the whole microscope. The best light for microscopic purposes is that obtained by catching the rays which are reflected from a white cloud. The conjoined use of the mirror and diaphragm can only be learned from actual experience.

Reflected light is employed in the examination of opaque objects, and the lenses of low power, manufactured by the principal London opticians, enable us to do so without assistance. Occasionally, however, the light of the sun is useful; and when this cannot be obtained, the rays of a lamp or gas light, concentrated by a bull's-eye lens, may be employed. Hence every microscope should be possessed of such a lens, and it is most convenient to have it attached to the body of the instrument by a moveable ring, and stem with two joints, as in the model figured.

Achromatic light is only serviceable in the examination of very delicate objects, with high powers. The apparatus necessary for obtaining it is occasionally useful in ascertaining the ultimate structure of muscle, or the nature of the markings on minute scales or fossils, but is useless for the purposes of the medical man. In the same way I know of no benefit to be obtained by a polarising apparatus.

In addition to the mechanical and optical parts constituting the microscope itself, the box which contains it should possess a convenient place for holding a few slips of glass, a pair of small forceps, a knife, and two needles firmly set in handles. A micrometer to measure objects with is also essential to those who are making observations with a view to their exact description. No other accessories are necessary.

An excellent microscope of the model previously figured, by Oberhaeuser, with two objectives (Nos. 3 and 7), two eye-pieces (Nos. 3 and 4), a neat box with all the accessories necessary (with the exception of a micrometer, which had better be English) may be obtained in Paris for the sum of about 150 francs (£6), and will cost in Edinburgh, after payment of carriage and duty, about seven guineas. Nachet and Brunner's instruments are much cheaper, as are the smaller models of Oberhaeuser. Either of them, for all the purposes of the medical man, is amply sufficient.

Test-Objects.—The defining power of a microscope is generally tested by examining with it a transparent object, having certain fine markings, which can only be rendered clearly visible when the glasses are good. In all such cases, it is of course necessary to be familiar with the structure of the test-object in the first instance. If you are not confident on this point, it is better to trust to the judgment of a friend, whose knowledge of histology is ascertained, or place your dependence entirely on a respectable optician. One of the best test objects for a quarter of an inch lens is a drop of saliva from the mouth. For, if the microscope shows with clearness the epithelial scales, the structure of the salivary globules, their nuclei, and contained molecules, you may be satisfied that the instrument will exhibit all the facts with which, as medical men, you have to do.—(See Fig. 24.)

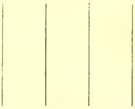
Mensuration and Demonstration.

Having, then, obtained a good instrument, and tested its qualities in the manner described, you should next determine the number of diameters linear the various combinations of glasses magnify. This you may do for yourself with the aid of a micrometer, a pair of compasses, and a measure.

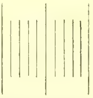
A micrometer is a piece of glass on which lines are ruled at the distance of $\frac{1}{100}$th or $\frac{1}{1000}$th of an inch. This must be placed under the instrument, when the lines and the distances between them will of course be magnified by the combination of glasses employed, like any other object. Taking a pair of compasses in one hand, we separate the points, and place them on the stage (always on a level with the micrometer magnified). Now, looking through the instrument with one eye, we regard the points of the compasses with the other, and mark off by the naked sight, say the $\frac{1}{100}$th of an inch, as magnified by the instrument. Though difficult at first, a little practice enables us to do this with the greatest accuracy. The result is, that if the distance magnified and so marked off ($\frac{1}{100}$th of an inch) is equal to three inches, the instrument magnifies 300 times linear; if two inches, 200 times; and so on.

To measure the size of objects, they may be placed directly on the micrometer; but as this is at all times inconvenient, whilst the object and micrometer, from their not being in the same plane, cannot, under high powers, both be brought into focus at once, it is better to use an eye-micrometer. Many ingenious inventions of this kind are to be procured. The most simple is a ruled micrometer placed in the focus of the upper glass of the eye-piece. With this we observe how many divisions of the eye-micrometer correspond with one of those magnified by the microscope, always making our observation in the centre of the field, where the aberration of sphericity is least. On the latter being removed and replaced by an object, it becomes a matter of mere calculation to determine its size. Thus, supposing each of the upper spaces in Fig. 23 to represent the $\frac{1}{1000}$th of an inch magnified 250 diameters linear, and five of the lower spaces, as seen in an eye-micrometer, to correspond with one of these—it follows that each of these latter must measure $\frac{1}{5000}$th of an inch. Oberhaeuser has made beautifully ruled eye-micrometers, for the model recommended, which those who wish to make measurements would do well to procure.

Fig. 23.



Spaces equal to 1-1000th of an inch magnified 250 diameters linear.



Five ruled spaces in an eye-micrometer, corresponding to one of those above, and consequently equal to the 1-5000th of an inch.

If it be not in your power to estimate the magnifying power for yourself, the optician will give you a table, setting forth the various degrees of enlargement possessed by the lenses, and different eye-pieces, with the tube up or down. This table should always be referred to during the description of objects, and the amount of magnifying power invariably stated.

The art of demonstrating under the microscope is only to be acquired by long practice, and, like everything requiring practical skill, cannot be learnt from books or systematic lectures. I can only, therefore, give you very general directions on this head.

All that is necessary in examining fluid substances, is to place a drop in the centre of a slip of glass, and letting a smaller and thinner piece of glass fall gently upon it, so as to exclude air bubbles, place it upon the stage under the objective. In this way the fluid substance will be diffused equally over a flat surface, and evaporation prevented, which would dim the objective. The illumination must now be carefully arranged, and the focus obtained, first by means of the coarse, and then by means of the fine, adjustment. It will save much time, in examining structures, to employ always, at one sitting, the same slips of glass, as it is easier to clean these with a towel, after dipping them in water, than to be perpetually shifting the coarse adjustment.

The action of water, acetic acid, and of other re-agents, on the particles contained in a fluid, may be observed by mixing with it a drop of the re-agent before covering with the upper glass; or if this be already done, the drop of re-agent may be placed at the edge of the upper glass, when it will be diffused through the fluid under examination by imbibition.

The mode of demonstrating solid substances will vary according as they are soft or hard, cellular or fibrous, etc. etc. The structure of a soft tissue, such as the kidney, skin, cartillage, etc., is determined by making very minute, thin, and transparent slices of it in various directions, by means of a sharp knife or razor. These sections should be laid upon a slip of glass, then covered over, and slightly pressed flat, by means of an upper one. The addition of a drop of water renders the parts more clear, and facilitates the examination, although it should never be forgotten that most cell-structures are thereby enlarged or altered in shape from endosmosis. Acid and other re-agents may be applied in like manner. The double-bladed knife of Valentin will enable you to obtain large, thin, and equable sections of such tissues, and permit you to see the manner in which the various elements they contain are arranged with regard to each other. Harder tissues, such as wood, horn, indurated cuticle, etc., may be examined by small thin sections, made in the same way. Very dense tissues, such as bone, teeth, shell, etc., require to be cut into thin sections, and afterwards ground down to the necessary thinness. Preparations of this kind are now manufactured on a large scale, and may be obtained at a trifling cost. A cellular parenchymatous structure, such as the liver, may be examined by crushing a minute portion between two glasses. If it be membranous, as the cuticle of plants, epithelial layers, etc., the membrane should be carefully laid flat upon the lower glass, and covered with an upper one. A fibrous structure, such as the areolar, elastic, muscular, and nervous tissues, must be separated by means of needles, and then spread out into a thin layer before examination, with or without water, etc.

The commencing observer should not be discouraged by the difficulties he will have to encounter in dissecting and displaying many tissues. He must remember that the figures he sees published in books are generally either fortunate or very carefully prepared specimens. Practice will soon enable him to obtain the necessary dexterity, and to convince himself of the importance of this mode of inquiry. He should early learn to draw the various objects he sees, before and after the action of re-agents, not only because such copies constitute the best notes he can keep, but because drawing necessitates a more careful and accurate examination of the objects themselves. A note-book and pencil for the purpose should be the invariable accompaniments of every microscope.

How to Observe with a Microscope.

The art of observation is at all times difficult, but is especially so with a microscope, which presents us with forms and structures concerning which we had no previous idea. Rigid and exact observation, therefore, should be methodically cultivated from the first, in order to avoid those errors into which the tyro, when using a microscope, is particularly liable to fall. Thus, you should carefully examine the physical properties of the particles and ultimate structures you may see, and not hastily conclude that you have under observation so-called pus, tubercle, or cancer-corpuscles, because they were obtained from what was, *a priori*, believed to be pus, tubercle, or cancer. Nothing has been more clearly demonstrated by the progress of histology, than the fact, that the naked sight has confounded different structures together, from a similarity of external appearance, and that the greatest caution is required at all times, but especially by learners, in forming opinions as to the nature of different tissues.

The physical characters which distinguish microscopic objects consist of—1st, Shape; 2d, Colour; 3d, Edge or border; 4th, Size; 5th, Transparency; 6th, Surface; 7th, Contents; and 8th, Effects of re-agents. These we may notice in succession.

1. *Shape.*—Accurate observation of the shape of bodies is very necessary, as many of these are distinguished by this physical property. Thus the human blood globules, presenting a biconcave round disk, are in this respect different from the oval corpuscles of the camelidæ, of birds, reptiles, and fishes. The distinction between circular and globular is very necessary to be attended to. Human blood corpuscles are circular and flat, but they become globular on the addition of water. Minute structures seen under the microscope may also be likened to the shape of well known objects, such as that of a pear, balloon, kidney, heart, etc. etc.

2. *Colour.*—The colour of structures varies greatly, and often differs, under the microscope, from what was previously conceived regarding them. Thus the coloured corpuscles of the blood, though commonly called red, are in point of fact yellow. Many objects present different colours, according to the mode of illumination—that is, as the light is reflected from, or transmitted through their substance, as in the case of certain scales of insects, feathers of birds, etc. Colour is often produced, modified, or lost, by re-agents, as when iodine comes in contact with starch corpuscles, when nitric acid is added to the granules of chlorophyle, or chlorine water affects the pigment cells of the choroid, and so on.

3. *Edge or Border.*—The edge or border may present peculiarities which are worthy of notice. Thus it may be dark and abrupt on the field of the microscope, or so fine as to be scarcely visible. It may be smooth, irregular, serrated, beaded, etc. etc.

4. *Size.*—The size of the minute bodies, fibres, or tubes which are found in the various textures of animals, can only be determined with exactitude by actual measurement, in the manner formerly described. It will be observed, for the most part, that these minute structures vary in diameter, so that when their medium size cannot be determined, the variations in size from the smaller to the larger should be stated. Human blood-globules in a state of health have a pretty general medium size, and these may consequently be taken as a standard with advantage, and bodies may be described as being two, three, or more times larger than this structure.

5. *Transparency.*—This physical property varies greatly in the ultimate elements of numerous textures. Some corpuscles are quite diaphanous, others are more or less opaque. The opacity may depend upon corrugation or irregularities on the external surface, or upon contents of different kinds. Some bodies are so opaque as to prevent the

transmission of the rays of light, when they look black by transmitted light, although they be white, seen by reflected light. Others, such as fatty particles and oil globules, refract the rays of light strongly, and present a peculiar luminous appearance.

6. *Surface.*—Many textures, especially laminated ones, present a different structure on the surface from that which exists below. If, then, in the demonstration, these have not been separated, the focal point must be changed by means of the fine adjustment. In this way the capillaries in the web of the frog's foot may be seen to be covered with an epidermic layer, and the cuticle of certain minute fungi or infusoria to possess peculiar markings. Not unfrequently the fracture of such structures enables us, on examining the broken edge, to distinguish the difference in structure between the surface and the deeper layers of the tissue under examination.

7. *Contents.*—The contents of those structures, which consist of envelopes, as cells, or of various kinds of tubes, are very important. These may consist of included cells or nuclei, granules of different kinds, pigment matter, or crystals. Occasionally their contents present definite moving currents, as in the cells of some vegetables, or trembling rotatory molecular movements, as in the ordinary globules of saliva in the mouth.

8. *Effects of Re-agents.*—These are most important in determining the structure and chemical composition of numerous tissues. Indeed, in the same manner that the anatomist with his knife separates the various layers of a texture he is examining, so the histologist, by the use of re-agents, determines the exact nature and composition of the minute bodies that fall under his inspection. Thus, *water* generally causes cell formations to swell out from endosmosis; whilst syrup, gum-water, and concentrated saline solutions, cause them to collapse from exosmosis. *Acetic acid* possesses the valuable property of dissolving coagulated albumen, and, in consequence, renders the whole class of albuminous tissues more transparent. Thus, it operates on cell walls, causing them either to dissolve or become so thin as to display their contents more clearly. *Æther*, on the other hand, and the alkalies, operate on the fatty compounds, causing their solution and disappearance. The *mineral acids* dissolve most of the mineral constituents that are met with, so that in this way we are enabled to tell with tolerable certainty, at all events the group of chemical compounds to which any particular structure may be referred.

PRINCIPAL APPLICATIONS OF THE MICROSCOPE TO DIAGNOSIS.

A perfect application of the microscope, for the purposes of diagnosis, can only be arrived at by obtaining, in the first instance, a complete knowledge of the tissues of plants and animals, both in their healthy and diseased conditions. The medical practitioner may be called upon to distinguish, not only the various structures which enter into every species of food, every kind of animal texture and fluid, and every form of morbid product, but he will frequently have to judge of these when more or less disintegrated, changed, or otherwise affected by the processes of mastication, digestion, expectoration, ulceration, putrefaction, maceration, etc. etc. In this place, however, I propose merely calling your attention to those points which are more likely to fall under your notice at the bed-side. No doubt, the practical applications of the microscope are daily extending, and whilst there are many points which may be said to be scarcely investigated, those which have been most so require to be further studied. At the same time, a careful and persevering examination of the morphological elements found in the various excreta of the body, as modified by different diseases, or by constitution and diet, cannot but prove of great importance in the present state of practical medicine. Hence, besides shortly discussing what is known, I shall especially indicate what are those subjects which may be elucidated by such of you whose previous histological observations qualify them for the task.

Saliva.

The readiest way of examining the saliva is to collect a drop of that fluid at the extremity of the tongue, and let it fall on the centre of a slip of glass. It should be allowed to remain quiescent for a minute or so, until most of the bubbles of air have collected in a mass on the surface. This should then be gently scraped off or placed aside with a needle, and the subjacent fluid covered with a thin glass. There will now be observed, with a magnifying power of 250 diameters linear —1st, The salivary corpuscles; 2d, Epithelial scales of the mouth; 3d, Molecules and granules.

1. *The salivary corpuscles* are colourless spherical bodies, with smooth margins, varying in size from the $\frac{1}{3000}$th to the $\frac{1}{1800}$th of an inch in diameter. They contain a round nucleus, varying in size, but generally occupying a third of the cell; and between this nucleus and the cell wall are numerous molecules and granules, which communicate to the entire corpuscle a finely molecular aspect. The addition of

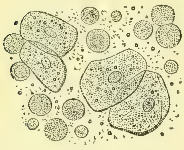


Fig. 24.

water causes these bodies to swell out and enlarge from endosmosis; while acetic acid somewhat dissolves the cell wall, and it becomes more transparent; while the nucleus appears more distinct as a single, double, or tripartite body. Both water and acetic acid also produce coagulation of the albuminous matter contained in the fluid of the saliva, which assumes the form of molecular fibres, in which the corpuscles and epithelial scales become entangled, and present to the naked eye a white film.

2. *The Epithelial scales* found in the saliva are derived from the mouth, and consist of flat plates, variously shaped, but generally presenting an oblong or squarish form, more or less curled up at the sides. Not unfrequently these have five or six sides, and are assembled together in groups, with their edges adherent. In size they vary from the $\frac{1}{800}$th to the $\frac{1}{500}$th of an inch in length. Embedded in their substance is a round or oval nucleus, together with numerous molecules and granules. Water produces no change in these bodies; but acetic acid renders the scale more transparent, and the nucleus to appear more distinct, with a darker edge.

3. Associated with the salivary corpuscles and epithelial scales are several *molecules and granules*, which vary in number in different people, and at various times of the day.

There may also be occasionally found in the saliva various foreign substances derived from the food,—such as granular debris of different kinds, starch globules or vegetable cells, muscular fasciculi, portions of areolar tissue, tendon, or spiral filaments, etc.—derived from pieces of texture which have adhered to the teeth during mastication.

The saliva may present various alterations, dependent on disease of the mucous membranes of the mouth and tongue. This, when ulcerated, causes an increase in the molecular and granular matter. Many of the epithelial scales also lose their transparent character and become opaque, from an augmentation of granular matter in their substance. Not unfrequently, under such circumstances, they give rise to confervoid growths, which mainly spring up in the debris collected in the mouth, either on the surface of ulcers, in the sordes which collect on the

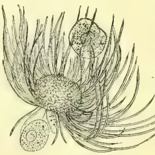


Fig. 25.

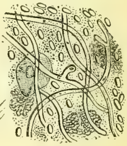


Fig. 26.

Fig. 24. Salivary corpuscles, epithelial scales, with molecules aud granules, as seen in a drop of saliva.

Fig. 25. Minute confervoid filaments springing from an altered epithelial scale, scraped from the surface of a cancroid ulcer of the tongue (*Leptothrix buccalis*).

Fig. 26. Confervoid filaments and sporules, in the exudation on the mouth and gums, constituting *Muguet* in infants. *Magnified 250 diameters linear.*

teeth, gums, and tongue of individuals labouring under fever, or even in the inspissated mucus of persons who sleep for a considerable time with the mouth open (Fig. 25). In infants, the tongue and cavity of the mouth are not unfrequently covered with a yellowish flocculent matter, constituting the disease named *muguet* by the French, in which sporules and confervoid filaments, in a high state of development, may be detected in considerable numbers (Fig. 26).

In epithelial cancroid of the tongue, the epithelial scales exhibit a great tendency to split up and form fibres, and may frequently be found on the surface of the ulcer presenting the form here figured (Fig. 27).

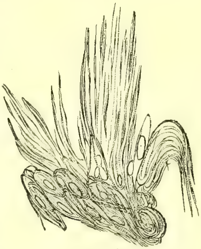


Fig. 27.

An histological examination of the saliva, of the fur and load of the tongue, in the great majority of diseases, is still a desideratum.

MILK.

On examining a drop of milk* we observe a number of bodies rolling in a clear fluid. These bodies, in healthy milk, are perfectly spherical, with dark margins, smooth and abrupt on the field of the microscope, with a clear transparent centre, which strongly refracts light. In size they vary from a point scarcely measurable, up to, in different specimens, the $\frac{1}{4000}$th or $\frac{1}{3000}$th of an inch in diameter. In excess of ether they are dissolved or disappear; but if this re-agent be in small quantity, exosmosis takes place, and the field of the microscope is covered with loose globules of oil, of various forms. Water causes the milk globules to swell out, but very slightly. Acetic acid coagulates the caseous fluid in which they swim, and causes the globules to be aggregated together in masses. Several of the globules also exhibit, under the action of this re-agent, a certain flaccidity, and readily run into one another under pressure.

These globules consist of an albuminous delicate envelope, enclosing a drop of oil or butter. The membrane keeps them separate, so long as it is intact; but, dissolved by means of acetic acid, or ruptured by heat or mechanical violence (as in the churn), the butter is readily separated and collected. Cream is composed of the larger of these globules, which, owing to their light specific gravity, float on the surface of milk when allowed to repose.

The richness of milk is determined by the quantity of these globules. An examination of cow's and human milk will at once shew that the former contains a larger number than the latter. In all efforts, however, to determine the relative value of milk by microscopic examination, great care must be taken that the drop of fluid examined should be of the same bulk, that the same upper glass should be used in every case, and that it should be applied and pressed down with the same force. It is very difficult at all times strictly to fulfil these conditions, for not only is great skill in manipulation required, but an intimate acquaintance with the appearance of milk as seen under the microscope, is necessary, before any confidence can be placed in this mode of testing the quality of different specimens of the fluid. At the same time, the difference in the amount of oily constituents between the milk of the cow, ass, and human female, may in this way be easily determined.

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* The mode of examining all fluids is the same, and is described p. 68; it need not be repeated.

Fig. 27. Fringe-like epithelium, from the surface of an ulcer on the tongue. 250 *di.*

In the same manner the various adulterations of milk are at once determined. Water, of course, separates the globules more and more from each other according to its amount. Flour will exhibit the large starch corpuscles, which are changed blue by the action of iodine. Chalk shews numerous irregular mineral particles, which are soluble in the mineral acids; and broken-down brain will be distinguished by large oil globules, mingled with fragments of fine nerve-tubes. Milk, when acid, exhibits the same character that it does under the action of acetic acid.

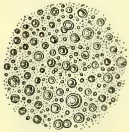
Fig. 28.

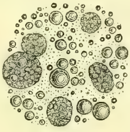
Fig. 29.

Healthy and fresh milk is indicated by a certain uniformity in the size of the globules; by their perfectly globular form; by their rolling freely over each other, and not collecting together in masses (Fig. 28). When the latter circumstance occurs, it is a sign of acidity.

The milk first secreted after parturition is called the colostrum. It is yellow in colour, and may be seen under the microscope to contain globules more variable in size, mingled with a greater or less number of compound granular bodies (Fig. 29.) These latter ought to disappear in the human female on the fifth or sixth day after parturition, but occasionally they remain, when the milk must be considered as unhealthy. In some cases I have seen them abundant so late as six weeks after the birth of the infant.

On some occasions, milk may be mixed with pus and blood, which are readily detected by the characters distinctive of each. Dr. Peddie has pointed out that milk can be squeezed from the mamma during the early months of pregnancy. Under such circumstances, it constitutes a most important sign of the pregnant state, especially of a first

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Fig. 28. Globules of cow's milk.

Fig. 29. Colostrum of the human female, containing milk globules greatly varying in size, with compound granular corpuscles. 250 *diam.*

pregnancy; for although the secretion at this time has seldom the external appearance of milk, but is serous-looking, and often very viscid and syrupy, still, if examined with the microscope, the characteristic milk globules will at once appear. See his valuable paper, "Monthly Journal of Medical Science," August 1848.

The Blood.

On examining a drop of blood drawn from the extremity of the finger by pricking it, there will be seen a multitude of yellow, round, bi-concave discs, rolling in the field of the microscope, which soon exhibit a tendency to turn upon their edge, and arrange themselves in rolls, like rouleaux of coins. These rouleaux, by crossing one another, dispose themselves in a kind of net-work, between which may be seen a few colourless spherical corpuscles, having a molecular surface, and a few granules. The coloured blood-corpuscles vary in size from the $\frac{1}{5000}$th to the $\frac{1}{3000}$th of an inch in diameter, their average size being about the $\frac{1}{4000}$th of an inch—according to Gulliver, $\frac{1}{3200}$th of an inch. Owing to their bi-concave form, they present a bright external rim with a central shadowed spot, or a bright centre and a dark edge, according to the focal point in which they are viewed (Fig. 30). If the blood be exposed to the air a little time before examination, or if it be obtained by venesection, the edges of the corpuscles may often be observed to have lost their smooth outline, and to have become irregular, notched, serrated, beaded, etc. (Fig. 31). Long maceration in serum, or other circumstances, frequently cause them to diminish in bulk half their natural size, and present a perfectly spherical coloured body. On the addition of water, the blood discs become spherical, and lose their colour. On adding syrup, they become flaccid and irregular. Strong acetic acid dissolves them rapidly, and very weak acetic acid does so slowly, or diminishes their bulk by one-half.

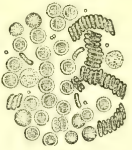
Fig. 30.

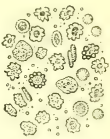
Fig. 31.

The colourless corpuscles of the blood are spherical in form, and vary in size from the $\frac{1}{2500}$th to the $\frac{1}{2000}$th of an inch in diameter. Their surface presents a molecular or dotted appearance, which almost disappears on the addition of water, when they swell out by endosmosis. Acetic acid renders the external cell-wall very transparent, and brings the nucleus into view, consisting of one, two, or three round granules.

Fig. 30. Blood-corpuscles, drawn from the extremity of the finger. On the left of the figure they are isolated, some flat and on edge, some having a dark and others a light centre, according to the focal point in which they are viewed. On the right of the figure several rolls have formed. Two colourless corpuscles and a few granules are also visible.

Fig. 31. Blood-corpuscles altered in shape from exosmosis. 250 *diam.*

The examination of the blood by the microscope enables us to determine certain pathological conditions of that fluid, which, though few in number, are by no means unimportant.

In several diseases, the blood presents unusual spissitude, depending on excess of fibrine. In this condition the coloured blood-corpuscles easily lose under pressure their rounded margin, and assume a caudate or flask-like shape. They do not present their usual tendency to accumulate in rolls, but aggregate themselves together in irregular masses, as represented Fig. 32.

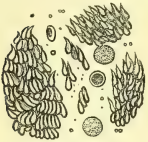
Fig. 32.

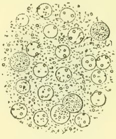
Fig. 33.

In certain internal hemorrhages the blood-corpuscles break down, or become partially dissolved, when the external envelope is seen very transparent, the shadowed spot disappears, and there is found in their interior one or more granules. The liquor sanguinis also contains an unusual number of granules (Fig. 33). The same change is occasionally observable in the blood extravasated below the skin in scurvy or purpura hemorrhagica.

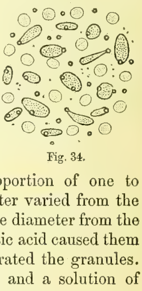
Fig. 34.

In a woman who died of cholera, Dr. James M. Cowan observed a remarkable alteration in the blood, which he was so good as to shew me. It consisted in the coloured corpuscles being paler than usual, and the colourless ones normal, but mingled with these were others varying in shape and size. They were generally circular, but some were oval, and a few caudate. They had a well defined external smooth border, having one or two bright refracting granules, generally situated in the external membrane, and occasionally projecting from it. When seen edgeways, they were flattened, and existed in the proportion of one to seven of the coloured corpuscles. Their long diameter varied from the $\frac{1}{1200}$th to the $\frac{1}{2000}$th of an inch, and their transverse diameter from the $\frac{1}{2000}$th to the $\frac{1}{4000}$th of an inch. The addition of acetic acid caused them to swell out, dissolved their external wall, and liberated the granules. Aqua potassæ rendered the whole structure paler, and a solution of muriate of soda rendered them more distinct, and of smaller size.*

We have seen that, in a healthy condition, the blood possesses very few colourless corpuscles; but there is a certain state of that fluid I was

* See Dr. Cowan's case.—Monthly Journal of Medical Science. March 1854.

Fig. 32. Blood-corpuscles altered in form, and aggregated together, in thickened blood.

Fig. 33. Altered blood-corpuscles in the fluid of an hæmatocele.

Fig. 34. Appearance of blood once observed in a case of cholera. 250 *diam.*

the first to describe in 1845, and have since called "Leucocythemia," or white-cell blood, in which they are very numerous, generally associated with enlargement of the spleen or other lymphatic glands. The blood then presents the characters represented in the accompanying figures. (See the section on diseases of the blood.)

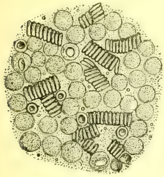
Fig. 35.

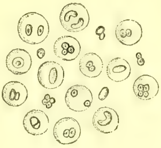
Fig. 36.

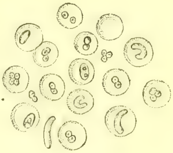
Fig. 37.

It has been affirmed that the colour and number of the corpuscles of the blood undergo a change in plethora, fever, jaundice, dropsies, cholera, etc., but exact observations are wanted to confirm the statement. I have never been able to satisfy myself that any such changes were observable in these diseases by means of the microscope. In chlorosis the number of the blood-globules is undoubtedly diminished; but this is determined by the size of the clot, rather than by microscopic demonstration.

Occasionally the serum of the blood presents a lactescent appearance; and, on being allowed to remain at rest some hours, a white creamy pellicle forms on the surface. This consists of very minute particles of oil, which resemble the smaller molecules found in milk, and in the chyle.

Pus.

Normal or good pus, when examined under a microscope, is found to consist of numerous corpuscles, floating in a clear fluid, the *liquor puris.* The corpuscles are globular in form, having a smooth margin, and finely granular surface. They vary in size from the $\frac{1}{2000}$th to the $\frac{1}{1200}$th of an inch in diameter. There may be generally observed in some of them a round or oval nucleus, which is very distinct on the addition of water, when also

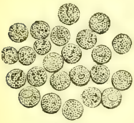
Fig. 38.

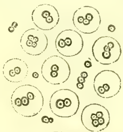
Fig. 39.

Fig. 35. Appearance of a drop of blood, in Leucocythemia.
Fig. 36. The same, after the addition of acetic acid.
Fig. 37. The same after the blood has stood 24 hours.
Fig. 38. Pus corpuscles, as seen in healthy pus.
Fig. 39. The same, after the addition of acetic acid. 250 *diam.*

the entire corpuscle becomes distended from endosmosis, and its granular surface is more or less diminished. On the addition of strong acetic acid the cell-wall is dissolved, and the nuclei liberated in the form of two, three, four, or rarely five granules, each having a central shadowed spot. If, however, the re-agent be weak, the cell-wall is only rendered very transparent and diaphanous, through which the divided nucleus is very visible.

Occasionally these bodies are seen surrounded by another fine membrane, as in Fig. 40. At other times they are not perfectly globular, presenting a more or less irregular margin, associated with numerous molecules and granules. This occurs in what is called scrofulous pus, and various kinds of unhealthy discharges, from wounds and granulating surfaces. (Fig. 41.) In gangrenous and ichorous sores, a few of these irregular pus corpuscles are associated, not only with a multitude of molecules and granules, but with transformed and broken-down blood globules, the debris of the involved tissues, etc. etc.

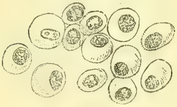

Fig. 40.

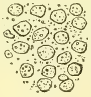

Fig. 41.

Sputum.

A microscopic examination of the sputum demands a most extensive knowledge of both animal and vegetable structure. I have found in it,—1st, All the tissues which enter into the composition of the lung, such as filamentous tissue, young and old epithelial cells, blood-corpuscles, etc. 2d, Mucus from the œsophagus, fauces, or mouth. 3d, Morbid growths, such as pus, pyoid, and granular cells; tubercle corpuscles, granules, and amorphous molecular matter; pigmentary deposits of various forms, and parasitic vegetations, which are occasionally found in the lining membrane of tubercular cavities. 4th, All the elements that enter into the composition of the food, whether animal or vegetable, which hang about the mouth or teeth, and which are often mingled with the sputum, such as pieces of bone or cartilage, muscular fasciculi, portions of esculent vegetables, as turnips, carrots, cabbages, etc.; or of grain, as barley, tapioca, sago, etc.; or of bread and cakes; or of fruit, as grapes, apples, oranges, etc. All these substances render a microscopic examination of expectorated matters anything but easy to the student.

To examine sputum, it should be thrown into water, when, on account of the air it contains, it will generally float on the surface; while the more dense portions, such as masses of crude tubercle or cre-

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Fig. 40. Pus corpuscles, surrounded by a delicate cell-wall.
Fig. 41. Irregular-shaped pus corpuscles, in scrofulous pus. 250 *diam.*

taceous concretions, fall to the bottom. It should be then teased, or broken up with a rod, when the various elements and particles it contains will gradually disengage themselves, and may be separated from the mass without difficulty. Nothing is more common, on examining portions of sputum with a microscope, than to observe the various aggregations of molecular and granular matter here figured—

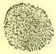
Fig. 42.

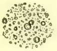
Fig. 43.

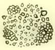
Fig. 44.

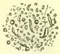
Fig. 45.

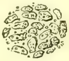
Fig. 46.

Occasionally little masses of a cheesy substance, and yellowish colour, may be found entangled in the purulent mucus, or collected at the bottom of the vessel. These, when examined, present a number of irregular-shaped bodies approaching a round, oval, or triangular form, varying in their longest diameter from the $\frac{1}{4000}$th to $\frac{1}{2000}$th of an inch. These bodies contain from one to seven granules, are unaffected by water, but are rendered very transparent by acetic acid. They are what have been called *tubercle corpuscles.* They are frequently mingled with a multitude of molecules and granules, which are more numerous in proportion to the softness of the tubercle (Fig. 46). See description of the tubercular exudation.

Sometimes indurated or gritty little masses are brought up with the sputum, which are derived from the cretaceous or calcareous transformation of chronic tubercle in the lungs. They consist of irregular masses of phosphate of lime, combined with more or less animal matter. On squeezing such as are friable between glasses, and examining their structure, they frequently may be seen to contain the elements represented in Fig. 47.

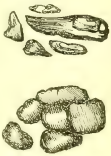
Fig. 47.

Sputum frequently presents a fibrillated appearance, which is common to all mucous discharges. This is caused by the deposition in viscid mucus of molecules, which assume a linear arrangement. This deposition is increased by the addition of water and acetic acid, so that they consist of albumen. These fine molecular fibres (see Figs. 53, 66) must be separated from the areolar and elastic tissue of the lung, which is not unfrequently found in sputum, indicating ulceration or sloughing of the pulmonary texture. Shroeder van der Kolk has lately stated, that these fragments may be found in the sputum before the

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Fig. 42. Mass, consisting of minute molecules, frequently seen in disintegrated tubercle.

Figs. 43 and 44. Masses composed of molecules and oily granules varying in size and mode of aggregation.

Fig. 45. Mass partly composed of the debris of a fibrous structure.

Fig. 46. Mass composed of tubercle corpuscles.

Fig. 47. Fragments of phosphate of lime occasionally found in the sputum. 250 *di.*

physical signs of ulceration of the lung, as determined by auscultation, are well characterised. This fact I have confirmed, and believe it to be one of great diagnostic importance.

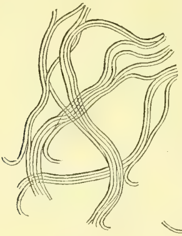

Fig. 48.

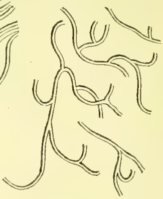

Fig. 49.

In acute pneumonia, the sputum frequently contains fibrinous casts of the minute bronchi, which present a branched mould of the tubes.

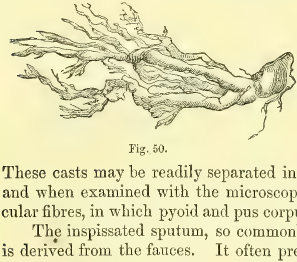

Fig. 50.

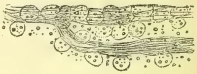

Fig. 51.

These casts may be readily separated in water, as previously described; and when examined with the microscope, are found to consist of molecular fibres, in which pyoid and pus corpuscles are infiltrated. (Fig. 51.)

The inspissated sputum, so commonly expectorated in the morning, is derived from the fauces. It often presents a dirty green or brownish colour, passing into black. When examined with a microscope, it may be seen to consist of epithelial cells, more or less compressed together, and varying in size from the $\frac{1}{2000}$th to the $\frac{1}{800}$th of an inch in diameter. The smaller ones are round, and closely resemble pus corpuscles; the larger ones are round or oval, with a distinct nucleus. In the dark-coloured portions of this sputum, the cells contain

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Fig. 48. Fragment of areolar and elastic tissue, still exhibiting the form of air cells from phthisical sputum.

Fig. 49. Fragment of elastic tissue of the lung, in sputum of a pulmonary gangrenous abscess.

Fig. 50. Fibrinous coagula in sputum, exhibiting moulds of the bronchi. Natural size. (*Peacock.*)

Fig. 51. Fibres, with corpuscles, in a fibrinous coagulum from a bronchus. 250 *diam.*

numerous granules and molecules, several of which are black and quite opaque. This black matter consists of carbon, and is unaffected by re-agents. The addition of acetic acid causes coagulation of the mucus in which the cells are embedded; and whilst it produces little change in the older cells, it dissolves, or renders transparent, the walls of such as are young, displaying a round, oval, or divided nucleus, as seen in the figure. (Fig. 53.)

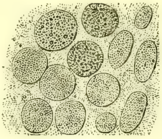
Fig. 52.

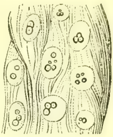
Fig. 53.

In the black phthisis of colliers the sputum is ink-black, and more or less tenacious. On examination with a microscope, the cells are seen to be loaded with carbonaceous pigment. Several of these cells are perfectly opaque, whilst others are almost colourless; and between the two extremes there is every kind of gradation as to intensity of blackness. This black pigment is unaffected by the strongest re-agents, nitro-muriatic acid, chlorine, and even the blow-pipe, failing to decompose it. It is, therefore, pure carbon, and differs from the pigment contained in cells of similar appearance in melanotic tumours, as in these latter the re-agents just mentioned at once destroy the colour.

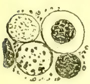
Fig. 54.

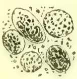
Fig. 55.

Vomited Matters.

The matters rendered by vomiting have not been made so frequent an object of microscopical observation as is necessary, with a view to diagnosis. In organic diseases of the organ, nothing has been ascertained on this head. In other cases, it almost always happens, that the matters rendered consist—1st, Of the food and drink, in various stages of decomposition and disintegration; 2d, Of alterations in the epithelial lining membrane of the stomach, œsophagus or pharynx, mingled with more or less mucus; 3d, Of certain new formations, which are produced in the fluids of the stomach.

1. It would constitute a very interesting series of observations, to determine, with the aid of the microscope, the structural changes which various articles of food undergo during the process of digestion in the stomach. This has not yet been done with accuracy, although there can be little doubt that compound tissues become disintegrated

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Fig. 52. Epithelial cells, embedded in mucus, expectorated from the fauces. Some are seen to contain black pigment; others resemble pus corpuscles.

Fig. 53. Another portion of expectorated mucus from the fauces, acted on by acetic acid, showing fibrillation and the changes in the young cells.

Figs. 54 and 55. Cells loaded with pigment in the sputum of the collier. 250 *diam.*

in the inverse order to that in which they are produced—that is to say, fibres become separated, embedded cells become loose, and, when aggregated together, their cohesion is destroyed. The cell-walls then dissolve, the nucleus still resisting the solvent process for some time ; but at length the whole is resolved into a molecular and granular mass, which in its turn becomes fluid. Such, however, is the different soluble properties of various edible substances, that, in a time sufficient for the perfect solution of some, others are scarcely affected. It may readily be conceived, that the transitions which these substances undergo, may occasionally render their detection difficult ; and such is really the case. Starch corpuscles, for instance, break down into rounded granules or molecules, and are very liable to puzzle an inexperienced observer. Tincture of iodine, from its peculiar reaction on these bodies, will always enable us to recognise them.

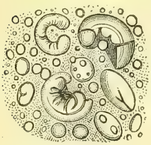

Fig. 56.

2. The various epithelial cells which line the passages leading to the stomach, as well as the structures peculiar to that organ itself, may be found in the vomited matters—of course mingled with the debris of edible substances. They also may have undergone various changes in appearance, from endosmosis, or even partial digestion. In cholera, the vomited matter consists principally of such altered epithelial cells or scales, many of which are derived from the fauces or œsophagus.

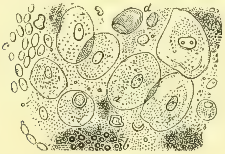

Fig. 57.

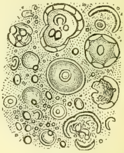

Fig. 58.

3. The new formations which may be produced in the stomach are principally vegetable fungi—such as various kinds of torulæ (see Fig. 57, *c*), and especially one first discovered in vomited matters by Mr. Goodsir, and which he has called, on that account, *Sarcina Ventriculi.* It consists of square particles, which apparently increase by fissiparous division in regular order, so that they present square

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Fig. 56. Appearance of starch corpuscles after partial digestion in the stomach.

Fig. 57. Flake in the rice-water vomiting of a cholera patient, shewing, *a*, large epithelial cells; *b*, milk globules, and coagulated caseine ; *c*, torulæ ; and *d*, half-digested epithelial scales, with liberated nuclei, more or less broken down.

Fig. 58. Structures observed in certain rice-water vomitings from a cholera patient, shewing bodies which consist of the half-digested uredo in bread. 250 *diam.*

bundles of four, sixteen, or a multiple of these. Although at first supposed to be peculiar to the stomach, I have frequently found them in the fœces; and in one case, in the urine. They were also found by Virchow, in an abscess of the lung.

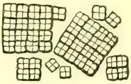
Fig. 59.

In addition to the bodies alluded to, occasionally observed in vomited matters, they may contain various morbid products, such as blood, pus, and cancer cells, colouring matter of the bile, etc.

Fœces.

The same difficulty attends the examination of the fœces as of the sputum; for there may be found in it,—1st, All the parts which compose the structure of the walls of the alimentary canal; 2d, All kinds of morbid products; and, 3d, All the elements which enter into the composition of food. The only difference is, that these last are generally more broken down or disintegrated.

Under certain circumstances, the diagnostic value attached to the examination of the fœces is greater than that of the sputum, or of vomited matters. For instance, when pus or blood globules are detected, we may infer that the more perfect these are, the nearer to the anus did they originate. In examples 4 and 6, (p. 62) I have shewn how the detection of certain vegetable structures, used as food, were serviceable in diagnosis; but this subject merits more extensive attention than has hitherto been paid to it.

In typhus, and other putrid fevers, the stools contain masses of large crystals of phosphates or carbonates. In dysentery they are loaded with pus and blood; and the former may also be detected on the surface of fœcal masses when the intestine is ulcerated. There may also be observed numerous torulæ, and occasionally sarcinæ. In cholera the white stools consist of mucus, in which the debris of epithelial cells are entangled; and as the nuclei of these cells resist disintegration for a long time, these round or oval bodies generally exist in considerable numbers (Fig. 60).

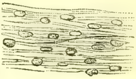
Fig. 60.

In a disease very common in Edinburgh, especially in women, in which flakes of membranous matter are thrown off from the bowels in large quantities, these present a very similar appearance to the cholera flakes just noticed.

Among the indigestible articles connected with the food, it was observed, in the autumn of 1849, that curious-shaped bodies were detectable, both in the vomited matters and stools of cholera patients. These were supposed to be parasitic formations connected with the

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Fig. 59. Sarcina Ventriculi.

Fig. 60. Structure of flakes in a rice-water stool, from a cholera patient. 250 *diam.*

cause of cholera, but were pointed out by Mr. Busk to be the *uredo-segitum*, occasionally found in bread. (Figs. 58 and 61.)

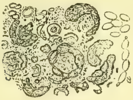


Fig. 61.

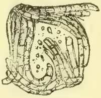


Fig. 62.

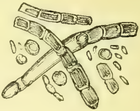


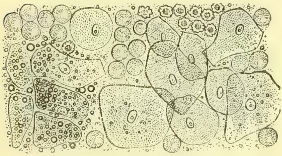
Fig. 63.

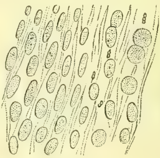
On one occasion, a dispensary patient brought to me a membranous mass, which had been evacuated by the bowels. It resembled a piece of boiled fine leather, of a greenish-yellow colour, and fibrous structure. On microscopic examination, it was found to be made up of an inextricable meshwork of confervoid growths, consisting of long tubes, with joints, and a few oval sporules, the former having a great tendency to break across. (Figs. 62 and 63.)

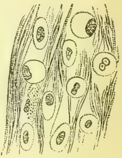
Uterine and Vaginal Discharges.

The diagnostic indications to be derived from the microscopic examination of these discharges, has not been much investigated; but there are few subjects which hold out the promise of more useful results to the medical practitioner. It can only be prosecuted by the obstetric histologist, who, on collecting the secretions poured out from the os uteri, or on the vaginal walls, by means of the speculum, should observe their structural peculiarities when quite fresh.*

The menstrual discharge will be found to consist of young epithelial cells, old epithelial scales, and blood globules, the number of which last will be greater or less according to the intensity of the colour.







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* On this point Dr. Tyler Smith's work on Leucorrhœa may be consulted with advantage.

Fig. 61. Portions of the uredo in bread, still further digested and disintegrated than is observable in the vomited matters. (Fig. 58.) Some torulæ are also present.

Fig. 62. Structure of confervoid mass passed from the bowels.

Fig. 63. The same, magnified 500 diameters linear, shewing their vegetable nature.

Fig. 64. Corpuscles seen in a chronic leucorrhœal discharge, consisting of,—1st, Large epithelial scales, from the vagina and cervix uteri. On the left of the figure some of these may be observed to have undergone the fatty degeneration. 2d, Numerous pus corpuscles; and, 3d, blood globules, the external edges of which are more or less dentated from exosmosis.

Fig. 65. Structure of gelatinous mucus from the os uteri.

Fig. 66. The same, after the addition of acetic acid. 250 *diam.*

A leucorrhœal discharge always consists of old epithelial scales, which may be more or less loaded with fat, combined with numerous young epithelial cells (round or oval), and pus corpuscles. (Fig. 64.)

The white gelatinous discharge, so frequently seen with the speculum to be derived from the os uteri, consists of gelatinous mucus, in which round or oval young epithelial cells are mingled. The mucus is copiously deposited in a molecular form, on the addition of acetic acid or water, whilst the walls of the cells are rendered transparent, and an oval granular nucleus made visible. (Figs. 65 and 66.)

Not unfrequently leucorrhœal and other discharges contain groups of blood-globules, the shapes of which are almost always more or less altered by endosmosis, on account of the viscid fluid mingled with them (see Fig. 64). Indeed, the variations observable in these discharges are dependent for the most part on the excess of one or more of the elements just mentioned—namely, epithelial cells or scales, pus or blood corpuscles, and gelatinous mucus.

In addition to the fluid discharges poured out from the uterus and vagina, there are a variety of morbid growths connected with these organs, the diagnosis of which may be materially facilitated by microscopic examination. The separation of fibrous, epithelial, and cancerous tumours and ulcers belong to this category, which must be conducted on the general principles referable to the diagnosis of morbid growths in general. I have had abundant opportunities of satisfying myself of the importance of this mode of proceeding, in cases where the substance, mucous surface, or cervix of the uterus has been more or less involved.

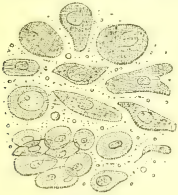
Fig. 67.

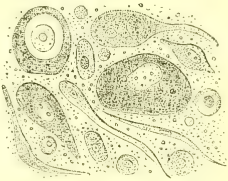
Fig. 68.

Mucus.

In all fluids secreted from a mucous membrane, many of which have been noticed, there may be found a gelatinous material, which has long been called mucus. It may vary in colour from a milk-white to a yellowish brown or even black tint, these variations being dependent on the cell structures or pigment it contains. By some it has been supposed that there are certain cell formations peculiar to mucus, which have been called "mucus corpuscles;" but it has always appeared to me that the various bodies found in this secretion are either different

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Figs. 67 and 68. Two specimens of cancerous juice squeezed from the uterus. 250 *diam.*

forms of epithelium, on the one hand, or pus cells on the other. Thus the round epithelial cells found in mucous crypts, or the bodies constituting permanent epithelium, when newly formed, before they have had time to flatten out, and perhaps more or less affected by endosmosis, are represented, Figs. 52 and 65. These are the mucous corpuscles of some writers. Again, when exudation is poured out on a mucous surface, and is mingled in greater or less quantity with the gelatinous secretion, it presents a marked tendency to be transformed into pus corpuscles, and hence why all irritations of mucous surfaces are usually accompanied by purulent discharges. The pus corpuscles, under such circumstances, present all the characters formerly noticed as peculiar to these bodies (see Figs. 38 and 64).

Hence, properly speaking, there is no such body as a mucus corpuscle, the cells found in mucus being either epithelial or pus cells, the number of which present communicates certain peculiarities to the discharge. Thus, as we have seen, the white gelatinous mucus discharged from the os uteri contains the former, whilst the peculiar fluid characteristic of a gonorrhœa or catarrh, in either sex, abounds in the latter. The gelatinous substance, however, in which these bodies are found, is what is peculiar to the fluid secreted from mucous surfaces, containing, as it does, a large amount of albumen possessing a remarkable tendency to coagulate in the form of molecular fibres. When recent, these are few in number, but on the addition of water or acetic acid they are precipitated in such numbers as to entangle the cell formations, and present a semi-opaque membranous structure (Figs. 53 and 66.)

The more healthy a mucous secretion, the more it abounds in this viscous albuminous matter, and the less are its cell elements. On the other hand, when altered by disease, the cell elements increase, and the viscosity diminishes.

Dropsical Fluids.

The fluids obtained by puncture of dropsical swellings, may in some cases, when examined microscopically, present peculiarities worthy of notice. Thus, in the serum collected within the tunica vaginalis testis, numerous spermatozoa may be found, constituting what has been called spermatocele. How these bodies find their way into this fluid is unknown, as no direct communication with the substance of the testicle has ever been seen; neither does their occurrence seem to interfere in any way with the successful treatment of this kind of dropsy, by injections, as practised in hydrocele.

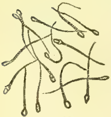

Fig. 69.

In the fluid of ascites, when removed from the body, there may usually be observed a few epithelial scales from the serous layer of the abdomen, which are more abundant in some cases than in others. Occasionally blood and pus corpuscles may be detected in greater or less quantity.

Fig. 69. Spermatozoa as observed in the fluid of Spermatocele. 250 *diam.*

In ovarian dropsy, various products may be found in the evacuated fluid, according to the nature of the contents of the cyst. Pus and blood corpuscles are common elements, but more commonly epithelial cells and scales, which occasionally accumulate in the cysts of ovarian tumours. At other times, masses of gelatinous or colloid matter are evacuated, which may present various appearances, according to the time it has been secreted (see Colloid Cancer and Ovarian Dropsy).

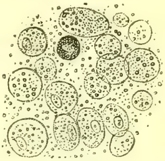

Fig. 70.

In the examination of dropsical fluids, also, there can be little doubt that further research will lead to very important results in diagnosis.

URINE.

Healthy human urine examined with the microscope, when recently passed, is absolutely structureless. Allowed to repose for twelve hours, there is no precipitate; occasionally a slight cloudy deposition may be observed, in which may be discovered a few epithelial scales from the bladder, a slight sediment of granular urate ammonia, or a few crystals of triple phosphate. In certain derangements of the constitution, however, various substances are found in the urine, which, in a diagnostic point of view, are highly important, and which we shall shortly notice in succession.

To examine the deposits found in urine, this fluid should be poured, in the first instance, into a tall glass jar; then decant the clear liquid, and put the lower turbid portion into a tall test tube, and again allow the deposit to form. In this manner, the structural elements accumulate in the smallest possible compass, and a large number of them are brought into the field of the microscope at once. The *quantity* of any salt or deposit in the urine can never be ascertained by the microscope. But in the great majority of cases, the appearances observed with that instrument, are sufficient in themselves to distinguish the *nature* of the various kinds of sediment met with, and these consequently are all that need be described in this place.

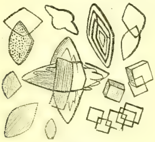

Fig. 71.

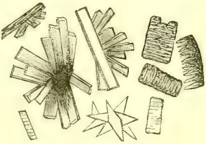

Fig. 72.

Uric Acid.—Uric acid crystals are almost always coloured, but

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Fig. 70. Cells in fluid, removed from an ovarian dropsy.

Fig. 71. Lozenge-shaped and rhomboidal crystals of uric acid.

Fig. 72. Aggregated and flat striated crystals of uric acid. 250 *diam.*

the tint varies from a light fawn to a deep orange red. The general colour is yellow. They present a great variety of forms, the most common being rhomboidal. The lozenge-shaped and square crystals, which are more rarely met with, isolated and in groups, are represented, Fig. 71. Not unfrequently they present adhering masses or flat scales with transverse or longitudinal markings, as seen, Fig. 72. Occasionally they assume the form of truncated rounded columns, as represented, with other structures, Fig. 77.

Urate of Ammonia most commonly assumes a molecular and granular form, occurring in irregular aggregated amorphous masses. Fig. 74. This may be separated from a similar-looking deposit of phosphate of lime by the action of dilute muriatic acid, which immediately dissolves the last-named salt, but acts slowly on urate of ammonia, setting free the uric acid. Sometimes, however, it occurs in spherical bodies of a bister brown colour, varying in size from the $\frac{1}{5000}$th to the $\frac{1}{2000}$th of an inch in diameter. The latter size rarely occurs. Occasionally they assume a stellate form, from needle-like or spicular prolongations coming off from the spherical body. I have seen both these forms associated, and the former so curiously aggregated together as to assume the appearance of an organic membrane, for which by some it was mistaken, until it was observed to dissolve under the action of dilute nitric acid. (Fig. 73.)

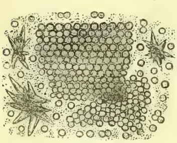
Fig. 73.

Triple Phosphate or Ammonio-Phosphate of Magnesia.—These crystals are very commonly met with in urine, and are generally well defined, presenting the form of triangular prisms, sometimes truncated, at others having terminal facets. (Fig. 74) If an excess of ammonia exist, or be added artificially, they present a star-like or foliaceous appearance, which, however, is seldom seen at the bed-side.

Most of the forms of urate of ammonia are represented, Figs. 73 and 74, in the latter associated with the triple phosphate.

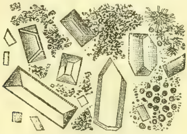
Fig. 74.

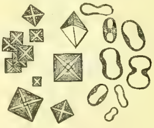
Fig. 75.

Oxalate of Lime most commonly appears in the form of octohedra,

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Fig. 73. Urate of ammonia, in a granular membranous form, and in rounded masses, with spicula.

Fig. 74. Triple phosphate, with various forms of urate of ammonia.

Fig. 75. Octohedral and dumb-bell shaped crystals of oxalate of lime. 250 *diam.*

varying in size, the smaller aggregating together in masses. Once seen, these bodies are readily recognised (Fig. 75.) Very rarely they present the form of dumb bells, or an oval body, the central transparent portion of which presents a dumb bell shape, while the shadowed dark portion fills up the concavities.

Cystine forms flat hexagonal plates, presenting on their surface marks of similar irregular crystals (Fig. 76.) Occasionally the centre is opaque, with radiations more or less numerous, passing towards the circumference.

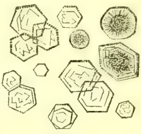

Fig. 76.

In addition to the various salts found in the urine, there may occasionally be found different organic products, such as blood and pus corpuscles, spermatozoa, vegetable fungi, exudation casts of the tubes, or epithelial scales from the bladder or mucous passages. Frequently one or more of these are found together, as in the following figure :—

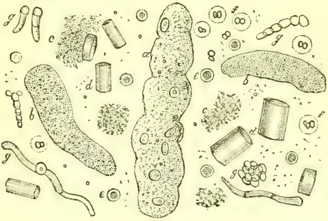

Fig. 77.

Very rarely casts of the tubes, principally composed of oily granules, may be seen, or epithelial cells, more or less loaded with similar granules, several of which also float loose in the urine, as in the accompanying figure :—

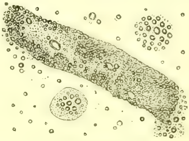

Fig. 78.

Although these casts of the tubes were at one time confounded together, they may now be separated into at least four distinct kinds, namely,—1st, Fibrinous or exudative; 2d, Desquamative; 3d, Fatty; and 4th, Waxy casts. The inferences to be derived from the presence of one

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Fig. 76. Flat and rosette-like crystals of cystine.

Fig. 77. Bodies observed in the urine of a scarlatina patient, 24 hours after being passed. *a*, Desquamated fragment of uriniferous tube. *b*, Exudation casts of uriniferous tubes. *c*, Amorphous urate ot ammonia. *d*, Columnar crystals of uric acid. *e*, Blood corpuscles. *f*, Pus corpuscles. *g*, Torulæ and vegetable fungi, which had been formed since the urine was excreted.

Fig. 78. Cast of a uriniferous tube, principally composed of oil granules, with fatty epithelial cell, and free oil granules, in urine of Bright's disease. 250 *diam.*

or more of these will be especially dwelt on in the section which treats of urinary diseases.

Spermatozoa are occasionally found in the urine, but must not be considered as of any importance, unless accompanied by the peculiar symptoms of spermatorrhœa (see Fig. 69.) The presence of torulæ in considerable quantity (Fig. 77, *g*) is indicative of the existence of sugar, which requires, however, for its confirmation, the application of chemical tests.

All the various appearances noticed are only diagnostic when accompanied by concomitant symptoms. Alone, they are not to be depended on; but, in combination with the history and accompanying phenomena, are capable of affording the greatest assistance in the detection of disease.

CUTANEOUS ERUPTIONS AND ULCERS.

An examination of the various products thrown out upon the skin in the different forms of eruption, ulcer, and morbid growth, may in many cases be of high diagnostic value. Of these we shall speak separately.

1. *Cutaneous Eruptions.*—In the vesicular and pustular diseases, there may be observed below the epidermis all the stages of pus formation, commencing in exudation of the liquor sanguinis, gradual deposition of molecular and granular matter, and formation around them of cell-walls. The eruption produced artificially by tartar emetic ointment offers the best opportunity of examining the gradual formation of these bodies under the microscope. Pus taken from all kinds of eruptions and sores presents the same characters, there being no difference between the pus in impetigo and that in variola. When a scab is formed, as in eczema or impetigo, a small portion of it broken down, mixed with water and examined under the microscope, presents an amorphous collection of granules, oil globules, and epithelial scales.

The squamous eruptions of the skin are three in number—namely, psoriasis, pityriasis, and ichthyosis. The dry incrustations which form on the surface in these diseases, essentially consist of epidermic scales more or less aggregated together. They are very loose in pityriasis, and occasionally mingled with debris of vegetable confervæ, similar to what grows on the mucous membrane of the mouth (Figs. 24 and 27). The scales are more aggregated together in psoriasis, and greatly condensed in ichthy-

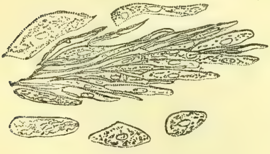

Fig. 79.

Fig. 79. Epithelial cells from crust of Psoriasis. 250 *diam.*

osis—occasionally in the latter disease presenting the hardness and structure of horn.

The epidermic tumours of the skin assume the form of corns, callosities, condylomatous warts, and what has been called *Veruca achrocordon.* They all consist, in like manner, of epidermic scales more or less condensed together; in the latter growth they surround a canal furnished with blood vessels. Sometimes they entirely assume a regular form, their interior being more or less hard, fibrous, and vascular—in short, a prolongation of the epidermis. (Figs. 79 and 80.) At other times they soften on their summits, and assume the structural peculiarities of the epithelial ulcer afterwards to be described.

The favus crust is composed of a capsule of epidermic scales, lined by a finely granular mass, from which millions of cryptogamic plants spring up and fructify. The presence of these parasitic vegetations constitutes the pathognomonic character of the disease. (See Favus).

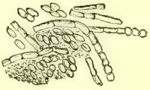
Fig. 80.

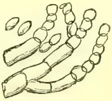
Fig. 81.

The skin is also attacked by certain animal parasites. Of these the pediculi, or lice, are too well known to need description. The Acarus scabiei and the Entozoon folliculorum are described and figured in the section on skin diseases.

2. *Cutaneous Ulcers.*—In healthy granulating sores, whilst the surface is covered with normal pus corpuscles (Fig. 38), the granulations themselves present fibre cells in all stages of development passing into fibres. In scrofulous and unhealthy sores, the pus is more or less broken down, or resembles tubercle corpuscles (Fig. 40).

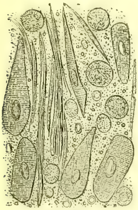
Fig. 82.

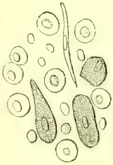
Fig. 83.

The epithelial ulcer is very common on the under lip, commencing in the form of a small induration or wart, but rapidly softening in the centre, assumes a cup-shaped depression, with indurated margins, which extend in a circular form more or less over the cheek and chin. An examination of the softened matter sometimes exhibits epithelial cells, in various stages of development, as in Fig. 83. At other times the cells are enlarged, flattened out, and more or less loaded with fat molecules and granules, or compressed concentrically round a centre,

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Fig. 80. The fungus (*Achorion Schonleini*) from a favus crust.

Fig. 81. The same, magnified 500 diameters linear.

Fig. 82. Epithelial cells, from the surface of an ulcer of the lip.

Fig. 83. The same, after the addition of acetic acid. 250 *diam.*

forming what have been called nest-cells. These growths, though generally denominated cancer, are at once distinguished by a microscopic examination. The so-called chimney-sweep's cancer of the scrotum is essentially a similar formation (See Epithelioma.)

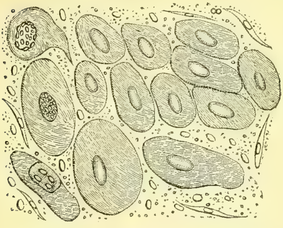
Fig. 84.

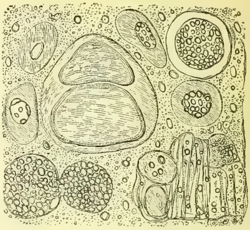
Fig. 85.

The cancerous ulcer of the skin is often difficult to distinguish microscopically from the epithelial ulcer, because the external layer, like it, is often composed of softened epidermis. When, however, a drop of cancerous juice can be squeezed from the surface it is found to contain groups of cancer cells, which, from their general appearance, may for the most part be easily distinguished. Considerable experience, however, in the knowledge, and skill in the demonstration, of cancerous and cancroid growths, are necessary in order to pronounce confidently on this point, and to this end an acquaintance with the whole subject of the histology of morbid growths is essential.*

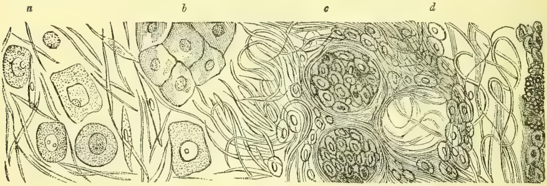

Fig. 86.

* See the Author's Treatise on Cancerous and Cancroid Growths. Edin. 1849.

Fig. 84. Epidermic cells from the edge of a softened epithelioma.

Fig. 85. Other cells from the centre of the softened portion.

Fig. 86. Appearance of section of cancerous ulcer of the skin,—*a*, Epidermic scales and fusiform corpuscles on the external surface. *b*, Group of epidermic scales. *c*, Fibrous tissue of the dermis. *d*, Cancer-cells infiltrated into the fibrous tissue, and filling up the loculi of the dermis. 250 *diam.*

USE OF CHEMICAL TESTS.

The chemical examination of urine, blood, milk, and other animal fluids, as well as the detection of poisons in vomited matters, or other organic mixtures and tissues, constitutes an extensive field of inquiry, —for a description of which, I must refer to works on chemistry and medical jurisprudence. At the bed-side much of this kind of investigation is now superseded by the use of the microscope, which at a glance enables us to detect the poverty and adulterations of milk, the spissitude and altered conditions of blood, the nature of various salts and precipitates in urine, etc. The action of chemical re-agents on the corpuscles, made visible by this instrument, has already been alluded to. Chemical tests are most valuable at the bed-side to determine the presence of albumen, bile, sugar, or chlorides in the urine, to which points alone I shall in this place direct your attention.

The Specific Gravity of the Urine is at once obtained by means of a urinometer, and should always be noted at the commencement of the examination of this fluid, as it furnishes important indications for further proceedings. Thus the specific gravity is generally diminished in chronic cases of Bright's disease, and increased in cases of Diabetes.

To Detect Albumen in the Urine.—Boil a portion of urine in a test tube over the flame of a spirit lamp, and observe the result. If there be much albumen, the entire fluid becomes white and opaque. If there be a small quantity, a greater or less haziness only may be occasioned. As this latter appearance may be induced by a superabundance of phosphates, nitric acid should be added, when, if the cloudiness be owing to salts, it will disappear, but if to albumen, it will be precipitated. A small quantity of nitric acid added to urine may also occasion haziness, which, however, if owing to the presence of salts, is re-dissolved by an excess of the acid. If both heat and nitric acid cause a white precipitate, albumen is undoubtedly present.

To detect Bile in the Urine.—The test for bile is nitric acid, which changes the fluid containing it in any quantity, first into a grass green, and then, if the test be added in excess, changes into a ruby-red or reddish brown tint. If the urine be very much loaded with bile, as sometimes happens in cases of jaundice, so that it resembles porter in appearance, it is better to dilute it with water before adding the acid. If the test be applied to the urine, placed in a clean white plate, so as to form a thin layer over the surface, the play of colours may often be distinctly seen assuming green, violet, pink, and yellow hues. If a very minute quantity of bile only exist in urine, the test produces at once a pink colour.

To detect Sugar in the Urine.—The three best tests for sugar in urine are those known as Moore's test, Trommer's test, and the Fermentation test. *Moore's test* consists in boiling, for five minutes, urine in a tube, with half its bulk of liquor potassæ. If sugar be present, the liquid assumes a brownish bistre colour. *Trommer's test* consists in adding one or two drops of a solution of sulphate of copper, so as to give the urine a pale blue colour. Liquor potassæ is then added to the extent of half the volume of urine employed. A pale blue precipitate of hydrated oxide of copper is thrown down, which, if sugar be present, is immediately dissolved, forming a purplish blue solution. The mixture now is to be boiled for a few minutes, when the presence of sugar is indicated by the precipitation of a reddish or yellowish-brown precipitate of suboxide of copper. If no sugar be present, the common oxide of copper is thrown down as a black precipitate. Care must be taken not to add too much sulphate of copper in the first instance. *Fermentation test.*—A few drops of yeast should be added to urine, and a test tube completely filled with the mixture, should be inverted and allowed to remain in a saucer, containing a little more of the urine. The whole should then be put in a warm place, of about 70 or 80 degrees for 24 hours. Fermentation ensues, and carbonic acid is formed, which collects at the top of the tube displaying the fluid. This is a valuable test, because it betrays the existence of a very minute quantity of sugar in the urine, and because, by using a graduated tube of a determinate bulk, the amount of the sugar can be calculated. Two equivalents of carbonic acid are equal to one equivalent of sugar.

The following solution kept prepared is very useful when many observations are made to detect grape sugar in the urine. Take of bitartrate of potash and crystallized carbonate of soda, of each 150 parts, of caustic potash 80 parts, of sulphate of copper 50 parts, and of water 1000 parts; dissolve the carbonate of soda and potash in part of the water boiling, then add the sulphate of copper powdered. When all the bitartrate is dissolved, add the rest of the water, and filter. A few drops of this solution added to a little urine in a test tube will, under the action of heat, throw down a dirty green or yellow precipitate of sub-oxide of copper, if sugar be present.

To detect Chlorides in the Urine.—Add to urine in a test tube an equal volume of distilled water to hold the salts in solution—then add a small drop of nitric acid to neutralize any ammonia that may be present; lastly, add a drop of a solution of nitrate of silver, when a dense white precipitate of the chlorides is precipitated. This is again soluble in an excess of liquor ammoniæ. If there be no chlorides, the urine remains clear, or if they be diminished in quantity, it becomes, on adding the nitrate of silver, more or less hazy.

In concluding this subject, allow me to impress upon you the great importance of making yourselves acquainted with all the modes of examination I have brought before you, rather than one or more of them. It too frequently happens that exclusive attention to a particular method of exploration, has rendered some medical men good observers of symptoms, whilst they are unacquainted with physical diagnosis; and again, among those who have cultivated the latter, there are some who can percuss and use the stethoscope with skill, who are ignorant of the use of the microscope, and the contrary. Now you should regard all instruments only as means to an end. In themselves they are nothing, and can no more confer the power of observing, reflecting, or of advancing knowledge, than a cutting instrument can give the judgment and skill necessary for performing a great operation. We should learn to distinguish between the mechanical means necessary for arriving at truths, and those powers of observation and mental processes which enable us to recognise, compare, and arrange the truths themselves. In short, rather endeavour to observe carefully and reason correctly on the facts presented to you, than waste your time in altering the fashion and improving the physical properties of the means by which facts are ascertained. At the same time, these means are absolutely necessary in order to arrive at the facts on which all correct reasoning is based; and perhaps no kind of knowledge has been so much advanced in modern times by the introduction of instruments and by physical means of investigation, as that of medicine. These enable the practitioner to extend the limits to which otherwise his senses would be limited. Chest measurers, pleximeters, stethoscopes, microscopes, specula, probes, etc. etc., are all useful, and in particular cases indispensable. I do not say employ one to the exclusion of the other, but be equally dexterous in the use of each. Do not endeavour to gain a reputation as a microscopist, as a stethoscopist, or as a chemist; but by the appropriate application of *every* instrument and means of research, seek to arrive at the most exact diagnosis and knowledge of disease, so as to earn for yourselves the title of enlightened medical practitioners. Above all, do not be led away by the notion that any kind of reasoning or theory will enable you to dispense with the careful observation of facts. What is called tact and skill is not a peculiar intuition, or a superior power of intelligence possessed by certain persons, but is always the result of constant and laborious examination of symptoms and signs in the living, combined with careful research into the nature of morbid organic changes discovered in the dead.

SECTION II.

PRINCIPLES OF MEDICINE.

Every animated being has a limited period of existence, during which it is constantly undergoing a change. So long, however, as this change takes place uniformly in the different parts of which it is composed, its physiological or healthy condition is preserved. But immediately the action of one organ becomes excessive or weak in proportion to the others, disease, or a pathological state, is occasioned. This state may be induced by direct mechanical violence, but may also occur from the continued or irregular influence of several physical agents, such as temperature, moisture or dryness, quality of the atmosphere, kind of food, etc. etc. These are always acting upon the vital powers of the individual as a whole, as well as incessantly stimulating the various organs to perform their functions. Life, then, may be defined in the words of Béclard—" organization in action." Health is the regular or normal, and disease the disturbed or abnormal condition of that action.

While such may be assumed to be our notion of disease in the abstract, what constitutes disease in particular has been much disputed. From the time of Hippocrates to that of Cullen and his followers, the external manifestation or symptoms constituted the only method of recognizing diseased action, and gradually came to be regarded as the disease itself. Then these symptoms were arranged into groups, divided, subdivided, and named, according to the predominance of one or more of them, or the mode in which they presented themselves. These artificial arrangements are the nosologies of former writers. All philosophical physicians, however, have recognized that the true end of medical inquiry is, if possible, to determine rather the altered condition of the organs which produces the disordered function, than to be contented with the study of the effects they occasion. But the difficulty of this inquiry has been so great, and a knowledge of the means of prosecuting it so limited, that it is only within the last thirty years medicine has been enabled to build up for herself anything like a solid scientific foundation. What has hitherto been accomplished in this way has been brought about by the conjoined cultivation of morbid anatomy, pathology, and clinical observation, greatly assisted, however, by the advance of numerous collateral branches of science, and especially in recent times by chemical and histological investigation. The result has been a complete overthrow of nosological systems, and an attempt to trace all maladies to their organic cause, and doubtless in proportion as this has been successfully accomplished, medicine has become less empirical and more exact. The organic changes, however, which produce or accompany some diseases have not yet been discovered, and consequently a classification of all maladies on this basis cannot be successfully carried out. The organic cause of epilepsy, hydrophobia, and of many fevers, for example, is as yet unknown. In the present state of medicine, therefore, when the morbid change in an organ is unequivocally the origin of the symptoms, we employ the name of the lesion to designate the disease; but when there is disturbance of function, without any obvious lesion of a part, we still make use of the principal derangement to characterise the malady. Thus as regards the stomach we say a cancer or an ulcer of that viscus, and thereby express all the phenomena occasioned. But if we are unable to detect such cancer or ulcer, we denominate the affection after its leading symptom, dyspepsia, or difficulty of digestion.

In endeavouring to carry out this distinction, however, modern physicians have fallen into a great error, inasmuch as they have continued to employ the nomenclature of our forefathers, and use words which were simply expressive of the presence of symptoms to indicate the altered condition of organs, the cause of those symptoms. Formerly inflammation meant the existence of pain, heat, redness, and swelling, it now means certain changes in the nervous, vascular, and parenchymatous tissues of a part. Formerly apoplexy meant sudden unconsciousness originating in the brain, now it is frequently used to express hæmorrhage into an organ, and hence the terms apoplexy of the lung and of the spinal cord. The two ideas are essentially distinct, and bear no reference to each other, because the same word may be, and often is employed under circumstances when its original meaning is altogether inapplicable. Hence it is incumbent on every one who gives to organic changes, words which have been long employed in medicine, to define exactly what he means by them. In this way old indefinite expressions, though still retained, have a more precise meaning attached to them. If, for instance, it be asserted that bleeding cut short an inflammation, let us understand what is cut short—the symptoms, the physical signs, a congestion of the vessels, or an exudation of the liquor sanguinis.

But notwithstanding the confusion which has necessarily resulted from the rapid advance of medicine in late years, and the frequent change of ideas with regard to the nature of morbid actions, it still follows that disease is only an alteration in the healthy function of organs. Hence all scientific classification of maladies must be founded on physiology, which teaches us the laws that regulate those functions. Therefore I venture to divide all diseases, in the first place, into two great classes, viz.—1, Diseases of nutrition; and, 2, Diseases of innervation.

ON THE GENERAL LAWS OF NUTRITION AND INNERVATION IN HEALTH AND DISEASE.

There have not been wanting some pathologists who have ascribed the origin of all diseases to an altered condition of nutrition and of the blood, whilst others have regarded even this function as subservient to that of innervation. In man, it is true, we find them inextricably united, and it becomes exceedingly difficult at all times to separate with exactitude what are the purely nutritive, and what the purely nervous phenomena. But a consideration of animated nature at large must satisfy us, that in the vegetable world, as well as in some forms of animal life, nutrition may proceed independently of a nervous system. We also feel satisfied that, in theory as well as in fact, the function of nutrition is capable of being separated from that of innervation. Doubtless there is no lesion whatever which does not in the higher class of animals involve both nutritive and nervous changes, but the only method of arriving at a knowledge of their conjoint action, of their mutual influence, or the manner in which sometimes one predominates over or mingles with the other, is by studying in the first instance the laws by which each seems to be governed.

Function of Nutrition.

The various modes in which nutrition becomes impaired, and the blood diseased, can only be understood by passing in review the different steps of the nutritive process. We have already pointed out how pathology and practical medicine must be based upon anatomy and physiology, and there is no one subject perhaps which is so well capable of illustrating this proposition as the one we are about to consider. For ages medical men have been in the habit of considering the blood to be the primary source of numerous maladies. It will be our endeavour to shew, by an analysis of the process of nutrition, that the changes of the blood, and the diseases which accompany them, are for the most part not primary but secondary—that is to say, they are dependent on previously existing circumstances, to the removal of which the medical practitioner must look for the means of curing his patient.

For the sake of convenience of description and reference, we shall divide the process of nutrition in man into five stages. 1. The introduction into the stomach and intestinal canal of appropriate alimentary matters. 2. The formation from these of a nutritive fluid, the blood, and the changes it undergoes in the lungs. 3. Passage of fluid from the blood to be transformed into the tissues. 4. The disappearance of the transformed tissues and their re-absorption into the blood. 5. The excretion of these effete matters from the body, in various forms and by different channels.

These different stages comprehend not only growth, but the processes of assimilation, absorption, secretion, and excretion; and we believe that it is only by understanding nutrition in this enlarged sense that we can obtain a correct explanation of those important affections, which may appropriately be called diseases of nutrition. We shall first, however, consider each of these stages separately.

1. *The introduction into the stomach and intestinal canal of appropriate alimentary matters.*—Alimentary matters have been divided into several groups. The chemist has divided them into azotized and non-azotized substances. The most important azotized principles are fibrin, albumen, and caseine; the most important non-azotized are fat, starch, gum, and sugar. Both animal and vegetable aliments are capable of yielding similar proximate principles, although in different proportions. Those which are most subservient to nutrition are albumen and oil. Dr. Ascherson of Berlin was the first to point out the effects produced by a union of these, and their importance in the formation of every organized tissue. When we regard the proportions in which these principles enter into our food, their presence in milk, the natural food of young animals, their universality in every blastema and organized tissue, and the numerous experiments which prove that they are capable, when united, although not alone, of furnishing the conditions necessary for the support of living animals, we are at once led to the conviction that albumen and oil are the chief alimentary matters destined for nutrition.

Whilst albumen and oil may be considered as types of the chemical division of nutritive substances into nitrogenized and non-nitrogenized, they prove that other conditions than chemical ones are necessary for nutrition. When mingled together, they produce an emulsion, identical in structure with milk, that is, containing numerous globules composed of a minute drop of oil, enclosed in an albuminous membrane. The function of the stomach and intestines consists in separating or converting from the contents submitted to them, albuminous and fatty matters in a fluid state, which being absorbed, constitute that emulsion observed within the extremities of the villi when they are called into activity, as well as the fatty basis of the chyle.

But fluid fat and albumen, together with the various kinds of drink, also hold in solution a third class of alimentary matters no less essential to nutrition—viz., mineral substances, such as phosphorus, sulphur, iron, potassium, sodium, calcium, and magnesium. These in different states of combination form a necessary constituent of every tissue and fluid, and some textures, as bone and teeth, are principally composed of them.

It is from the albuminous, fatty, and mineral groups of alimentary principles that all the various tissues and organs are formed. The three enter into the composition of every texture and every fluid, but are differently proportioned in each. The fibrous tissues abound in the albuminous, the adipose tissue in the fatty, and the osseous in the mineral principle. The excess or diminution of these three substances not only stamps certain features on the whole economy, but the morbid lesions of individual organs and textures are intimately connected with fibrous, fatty, and mineral formations.

It is unnecessary to dwell at any length upon the fact that of all the causes of disease, irregularity in diet is the most common. Neither need I do more than merely allude to the equally well-known circumstance, that of all the means of cure at our disposal, attention to the quantity and quality of the ingesta is by far the most powerful. The peculiar kind of interference with the aliment, which various diseases require, will be illustrated as we proceed further.

2. *The formation from alimentary matters of a nutritive fluid—the blood, and the changes it undergoes in the lungs.*—The exact process by which blood is formed from alimentary matters has now been accurately traced by physiologists. During mastication, the food is mingled with the saliva, an *alkaline* viscous fluid. In the stomach it is subjected to constant trituration and to the action of the gastric juice—an *acid* fluid, supposed to operate especially on the albuminous constituents of the food. On passing through the pylorus the whole is reduced to a pulpy matter called chyme. In the duodenum the chyme becomes mixed with bile, which produces important changes in it; but the nature of these, and the true uses of the bile, are subjects which have not yet been positively determined. The fatty constituents of the food are, by the conjoint action of heat, trituration with fluid albumen, and the influence of the Brunnerian, pancreatic, and other glands, which pour out another *alkaline* fluid, reduced to an exceedingly fine state of division. The chyme thus operated on is now gently propelled along the intestinal canal, by its vermicular contractions and its more fluid parts pass through the villi into the lacteals. The matter so absorbed forms chyle, which, being brought in contact with the cells elaborated by a series of lymphatic or blood glands, is transformed into corpuscles floating in a fluid. When at length the chyle enters the torrent of the circulation, the corpuscles are at once carried to the lungs, and become coloured in consequence of the action of the oxygen to which they are there exposed, and the fluid presents all the characters of blood.

The blood must be examined structurally and chemically. In structure it consists of numerous yellow corpuscles, a small number of colourless corpuscles, and a few granules, floating in a yellowish fluid, the liquor sanguinis. The liquor sanguinis consists of fibrin dissolved in serum, which has the property, when drawn from the body, or under certain other circumstances, of coagulating. The facts connected with this subject it is unnecessary to describe minutely here.

It is exceedingly difficult to ascertain the exact chemical composition of healthy blood, but from the analyses which have been made, we may for practical purposes consider its various constituents to be present in 1000 parts in the following proportions: Water varies from 760 to 800 parts; Fibrin from 1 to 3 parts; Albumen from 60 to 70 parts; Corpuscles from 130 to 150 parts; Extractive matters and fat, from 1 to 4 parts; Salts, from 5 to 10 parts.

We know from the results of numerous analyses, that these proportions are greatly changed in various diseases. What we are desirous of alluding to now, however, is the well-known fact that one of the most common causes of derangement in the blood is the different kinds of food. M. Denis mentions that in a young girl of good health the globules were represented by the proportion of 132. After 15 days of rigorous diet they were represented by 85. The other constituents, but more especially the water, albumen, fat, and salts, are modified to a like extent by changes in the diet.

The alterations which the blood undergoes in the lungs are the reception of a large amount of oxygen which is conveyed through the arteries to all parts of the economy, and the giving off a quantity of carbonic acid gas brought to them by the venous blood through the pulmonary vein. Hence the importance not only of dietetic regulations to furnish the material of the blood, but of a constant supply of fresh air to purify it and render it fit for the performance of its functions. Hence also the constant relation which exists between diet and the quantity and quality of the air we breathe, observable in various people in different parts of the world.

3. *The passage of fluid from the blood to be transformed into the tissues.*—From the blood a fluid blastema is continually passing through the capillaries for the formation and sustentation of the different tissues of the economy. It is necessary that this should take place to an amount proportionate to the matter supplied to the blood by assimilation on the one hand, and that dissipated by waste on the other. If more or less be given off, a morbid condition is occasioned. Thus an increased amount in a part gives rise to hypertrophies, a diminished amount produces atrophy.

This important function is now considered to depend upon an inherent vital property peculiar to the tissues themselves, which exercise a force at the same time attractive and selective. By its agency each tissue and gland attracts from the blood that amount of matter which is necessary to maintain its bulk, and at the same time selects from it the peculiar substance necessary for itself, or for the secretion it is destined to produce. Hence the liver keeps up its own nutrition, and at the same time selects the materials from the blood which serve to form bile. The kidney also is nourished, and forms urea, and so in like manner with all the glandular organs. In this way the matter drawn off from the blood is made subservient in numerous ways to the wants of the economy, here furnishing substance for growth or for replacing waste, and there giving material to supply the various secretions.

Not unfrequently this attractive and selective power in the tissues is deranged, producing increase or diminution in growth or secretion, general or partial. Not unfrequently the selective power appears to be lost, and the attractive power so much increased, that the liquor sanguinis is drawn out through the vessels, so that its fibrin coagulates in a mass outside them. This result, preceded or accompanied by certain changes in the vessels themselves, and more or less stagnation of the current of blood, constitutes the phenomena hitherto described as inflammation. Under these circumstances, other cells and tissues, altogether foreign to the healthy condition of the economy, are produced in what is now called the exudation, although the same general laws of growth and transformation preside over the abnormal as over the normal products. In this manner pus and cancer cells may be formed, or fibrous, cartilaginous, osseous, and other tissues causing different kinds of morbid growth.

4. *The disappearance of the transformed tissues, and their re-absorption into the blood.*—During life, whilst new tissue and new cells are continually being formed, the old ones disappear. The manner in which this is accomplished in certain adult tissues, such as muscle, bone, and areolar texture, has not yet been demonstrated, as the intermediate stages of growth have in them only been seen in the embryo. There is every reason to believe that individual particles, as they are dissolved and absorbed, are replaced by other particles derived from the blood, without necessarily passing through the stage of cell formation. Secreting surfaces, however, are continually producing new cells, in which the especial secretion is elaborated, and this either serves some definite purpose in the economy, as in the case of the gastric juice, or is separated from the body, as is the case with urea. The result is, that a large quantity of matter which has answered its purpose, breaks down, is dissolved, and again passes into the blood. A quantity of effete matter is thus continually entering the circulation, arising from the decay of all the tissues, but more especially from the muscular, osseous, nervous, adipose, and areolar tissues. The blood globules themselves dissolve after having performed their functions, and serve to swell the amount of effete matter in the blood.

So long as the matters absorbed from the tissues correspond in quantity and quality to the matters exuded and transformed, the physiological or healthy state of the blood is preserved. We know however, that this is continually liable to be disordered from any of the causes we have formerly noticed which derange nutrition. In some cases, absorption takes place with great rapidity, as we occasionally observe after starvation or the formation of large abscesses. In others, this process is in no way proportionate to the quantity of matters exuded, as in plethora, hypertrophy, and morbid growths.

The effete matters thus absorbed into the blood circulate with it, and always form an inherent part of its composition. It was first maintained by Zimmermann that they constitute the fibrin of the blood, which, instead of being exuded to form the tissues, as has been generally supposed, is excreted from the body by the different glands. It may be well to recapitulate some of the arguments in favour of this opinion.

There is no fibrin in chyme, and very little in the chyle, and what is remarkable, much less in the chyle of carnivorous than of herbivorous animals, as horses and sheep. Hunger does not diminish its quantity in the chyle of horses, but, on the contrary, rather increases it, if we can rely upon the experiments of Tiedemann and Gmelin, who concluded that the fibrin must get into the chyle through the lymphatics. Since, then, there is no fibrin in the chyme of carnivorous animals, whilst it constitutes so large a portion of their food, the object of digestion must be the transformation of fibrin into albumen. Further, the blood of carnivora contains less fibrin than the blood of herbivora, and in the egg there is no fibrin, although organization is proceeding rapidly in it. These facts are sufficient to prove that fibrin is in no way necessary to cell development and formation of the tissues. On the other hand, all those circumstances that cause exhaustion of the textures, or increase the amount of absorption from them, augment the amount of fibrin in the blood, as after inflammatory or other exudations, starvation, violent fatigue, pregnancy, and frequent bleeding or hæmorrhage. Both Nasse and Zimmermann found it far more abundant in lymphatic, weak persons, than in those who are strong and vigorous. Again, while there is little fibrin in the chyle of the lacteals, it exists in great quantity in the lymph of the lymphatics, as determined by Nasse in man, and by Müller in frogs.* It follows that the primary digestion must transform fibrin into albumen, rather than the latter into the former; and such is very probably also the result of the secondary digestion. How otherwise could so small a quantity, as from one and a half to three parts in a thousand, exist in healthy blood —an amount altogether disproportionate to what would be required, did this constituent build up the tissues as such? It appears, therefore, probable that the fibrin results partly from a solution of blood corpuscles, and partly from the effete matters of the tissues. Hence why absorption of exudations, or of the textures from exhausting causes, will produce increase of this constituent in the blood, as well as anything that favours the disintegrating process of the blood corpuscles themselves.

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* Zur Analysis und Synthesis des pseudoplastischen Processe. Berlin, 1844. P. 19.

It has been maintained by some that fibrin is secreted by the blood corpuscles. Dr. Carpenter supposed this to be the especial function of the colourless cells,* and Mr. Wharton Jones of the coloured nuclei.† But there are facts proving that fibrin must have a double origin as I have stated, one in the solution of both kinds of corpuscles, another from the tissues, of which its increase during inflammation and in rheumatism are examples, although in these morbid states, increase in the colourless or coloured corpuscles is certainly not essential. Hence fibrin must be referred to a process of disintegration, rather than to one of evolution,—but even in this capacity, it may serve to produce higher elaboration of that complex fluid, the blood.‡

The pathological changes which take place in the blood, as far as have been ascertained by Andral and Gavarret, Simon, and numerous other investigators, may be summed up in the words of Becquerel and Rodier, who ascertained—1st, That the simple fact of the development of a disease, almost always modifies in a notable manner the composition of that fluid. 2d, That venesection exercises a remarkable influence on the composition of the blood—the more marked the oftener it is repeated. Under these circumstances the blood is impoverished and rendered more watery—the albumen is slightly diminished—the fibrin, extractive matters, and free salts are not influenced, but there is a decided diminution of the blood corpuscles. 3d, That in a plethoric condition of the system there is no relative increase in the number of the corpuscles, or, in fact, any other change in the composition of the blood; it is simply the mass of the blood that is increased. 4th, That anemia is characterised by a diminution in the amount of the corpuscles. 5th, That inflammation induces an increase of the fibrin and of the cholestrine—the former varying from 4 to 10, and the latter being almost doubled. The albumen is diminished. 6th, That the amount of fibrin is diminished, and possibly its physical conditions altered under two classes of circumstances—the first embraces fevers, exanthematous disease, and intoxication; the second, starvation and purpura hæmorrhagica. 7th, That when any of the secretions are checked, their essential principles are contained in the blood in excess. For instance, when the secretion of the urine is suppressed, urea is found in the blood; when the bile is not excreted, it also abounds in the blood, etc. 8th, That there are three diseases in which the albumen of the blood is notably diminished, viz., in Bright's disease, in certain affections of the heart accompanied by dropsy, and in severe cases of puerperal fever.

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* British and Foreign Medical Review, vol. xv. pp. 272, 273.

† Ibid, vol. xiv. p. 597.

‡ I have carefully read the argument of an able writer in the British and Foreign Medical Review, vol. vii. pp. 153, 473, and vol. x. p. 200, in opposition to the view of Zimmermann, and in favour of the old doctrine; but I believe that all the facts he adduces may readily be shewn to favour rather than overthrow what appears to me the correct theory.

5. *The excretion of the effete matters from the body in various forms, and by different channels.*—The circulating fluid having received the effete matters in the manner we have described, again parts with them through the agency of the glands, in the form of various secretions and excretions. Glands are nourished like all other textures, but their cells are endowed with the property of secreting different substances from the blood. Thus the cells of the liver secrete bile; those of the kidney, urea; those of the mamma, milk; those of the testis, the spermatic fluid, etc. etc. In this way much of the carbonized and nitrogenized matters, as well as the albuminous and fatty principles, whether received from the assimilation of alimentary substances, or the result of the transformation of the tissues, are again excreted from the system, as bile, urea, etc.

The mineral matters received into the blood pass through the same process. The lime and phosphorus absorbed from the alimentary canal, unite to form the constituents of bone, and when re-absorbed are excreted under new combinations in the urine and fœces. The muriate of soda is decomposed in the tissues. The acid is found in the gastric juice, or is exhaled by the skin, while the soda is excreted largely with the bile by the liver. Sulphur, phosphorus, and the other minerals, also pass out of the system in various states of combination.

To complete the physiological changes connected with the function of nutrition, it is only necessary to remember that carbonic acid gas, the result of decompositions in the tissues, and water, are continually given off by the lungs and skin; and that oxygen, which enters the blood through the lungs, is continually entering into new combinations with the bases of the solids and fluids. These chemical combinations and exchanges are accompanied by the evolution of heat, whereby the animal temperature is kept up.

Thus we may consider that there are two kinds of digestion continually going on in the body—one in the stomach and intestines, the other in the tissues; that the blood is the recipient of both, distributing the results of the first to build up the tissues, and of the second to constitute the various excretions. In this manner the circulation of the blood may be compared to a river flowing through a populous city, which serves at the same time to supply the wants of its inhabitants, and to remove all the impurities that from numerous channels find their way into its stream.

From the foregoing considerations it follows that an eliminative function is to a certain extent brought about by all the processes of growth referred to, and that there can be no change, however limited, that is not necessarily associated with a general one in the system at large. As all the nutritive functions are connected with one another, an excess or diminution of local growth, by subtracting from or adding to the constituents of the blood, must produce an alteration in that fluid both as to quantity and quality. The idea of Treviraus, viz., "that each single part of the body, in respect of its nutrition, stands to the whole body in the relation of an excreted substance," has been ably shewn by Mr. Paget to account for various processes in health, under the name of "complimental nutrition."* The same notion has been still further extended by Dr. William Addison, who correctly points out, that in the distinctive eruptive fevers, such as small-pox, the numerous minute abscesses in the skin eliminate the morbid poison, which formerly existed in the blood, and are in this way essential to the cure. This provident action he denominates "cell therapeutics."† Hence there are fixed processes in abnormal as in normal nutrition, with which it is essential for the medical practitioner to be acquainted, in order that, instead of operating blindly or empirically, he may act scientifically, or in accordance with natural laws.

Further, we cannot avoid observing that the process of nutrition is a continuous round, which in the natural world may be said to commence with the reception and terminate with the preparation of aliment, vegetable or animal; that this is observable not only in the "chemical balance of organic nature," so beautifully described by Dumas, but in the incessant chemical compositions and decompositions, as well as structural formations and disintegrations which are peculiar to all vital entities. If so, it must be apparent that our knowledge of the animal economy and of the diseases to which it is liable, can only be elucidated by investigating the nature of such chemical and structural changes, together with the necessary relations that each one bears to the others, and that it is on such kind of knowledge alone that medicine as a scientific art can ever repose in security.

We can now readily understand how derangement in one stage of the nutritive process more or less affects the others. Thus, if alimentary matters are not furnished in sufficient quantity, and of a proper quality, the blood is rendered abnormal, and it necessarily follows that the matters it gives off will be abnormal also, and its subsequent transformations more or less modified. Again, if secretion be checked, the blood is not drained of its effete matter; and if excretion be prevented, the secretions themselves may enter the blood, and act upon it as a poison.

A diseased or morbid state of the blood, therefore, may arise from either of the stages of nutrition we have described, being rendered irregular, or otherwise abnormal. In whatever part of the circle interruption takes place, it will, if long continued, affect the whole. Thus, a bad assimilation of food produces through the blood bad secretions and excretions, whilst an accidental arrest of one of the latter reacts through the blood on the assimilating powers. The forms of disease thus arising may be endless, but as regards nutrition, they may all be traced to the following causes:—

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* Lectures on Surgical Pathology. Lecture 2.

† Addison on Cell Therapeutics. 1856.

1. An improper quantity or quality of the food.
2. Circumstances preventing assimilation or impeding respiration.
3. Altered quantity or quality of nutritive matters passing out of the blood.
4. The accumulation of effete matters in the blood.
5. Obstacles to the excretion of these from the body.

Examples in which each of these causes, separately or combined, have occasioned disease, must have occurred to every practitioner. It is true that all general diseases are accompanied by certain changes in the blood, but these changes are to be removed, not by operating on the blood directly, but by obviating or removing those circumstances which have deranged the stage of nutrition primarily affected. For instance, a very intense form of disease may be produced in infants, from improper lactation. The remedy is obvious, and we procure a healthy nurse. Ischuria is followed by coma, from the accumulation of urea, we give diuretics to increase the flow of urine, and the symptoms subside. In the one case we furnish the elementary principles necessary for nutrition; in the other, we remove the residue of the process. In both cases the blood is diseased, but its restoration to health is produced by acting on a knowledge of the causes which led to its derangement.

In the same manner we might illustrate the indications for correct practice in the other classes of causes tending to derange the blood, which we have enumerated. Thus, although there be a proper quantity or quality of the food, there may be circumstances which impede its assimilation; for instance, a too great acidity or irritability of the stomach—the use of alcoholic drinks—inflammation or cancer of the organ. It is the discovery and removal of these that constitute the chief indications of the scientific practitioner. Again, the capillary vessels become over-distended with blood, and the exudation of liquor sanguinis to an unusual amount takes place, constituting inflammation. How is this to be treated? In the early stage topical bleeding, if directly applied to the part, may diminish the congestion, and the application of cold will check the amount of exudation. But the exudation having once coagulated outside the vessels, acts as a foreign body, and the treatment must then be directed to furthering the transformations which take place in it, and facilitating the absorption and excretion of effete matter. This is accomplished by the local application of heat and moisture—the internal use of neutral salts to dissolve the increase of fibrin in the blood, and the employment of diuretics and purgatives to assist its excretion by urine or stool.

The general principle we are anxious to establish from this general sketch of the nutritive functions is—that diseases of nutrition and of the blood are only to be combated by an endeavour to restore the deranged processes to their healthy state, in the order in which they were impaired; that for this purpose, a knowledge of the process of nutrition is a preliminary step to the proper treatment of these affections; that the theory of acting directly on the blood is incorrect; and that an expectant system is as bad as a purely empirical one.

FUNCTION OF INNERVATION.

The function of innervation is also made up of the performance of various actions, widely different from each other, although associated together. These actions lead to the manifestation of intelligence, sensation, and combined motion. But as the connection between these is not capable of exhibiting such an order of sequence, as has been made apparent among the nutritive processes, it will be necessary to describe them in a different manner.

General Anatomy and Physiology of the Nervous System.

Structure and Arrangement of the Nervous System.—To the eye, the nervous system appears to be composed of two structures—the grey or ganglionic, and the white or fibrous. The ganglionic, when examined under high powers, may be seen to be composed of nucleated corpuscles, varying greatly in size and shape, mingled with a greater or less number of nerve tubes, also varying in calibre. One important fact, with regard to these corpuscles, is, that many of them may be demonstrated to throw out prolongations, which are in direct communication with, or constitute, the central band or axis of Remak and Purkinje within the fibres. The fibres, indeed, may be shewn to consist of minute tubes, which are smallest towards the periphery of the cerebrum, larger towards its base, and largest in the nerves. They are of three kinds—1st, Finely cylindrical, as observed in the optic and auditory nerves; 2d, Varicose, as in the white substance of the cerebral lobes and of the spinal cord; and 3d, Larger and of regular size throughout, as in the nerves. There are also bundles of gelatinous or flat fibres, the nature of which is much disputed, very common in the olfactory nerve and sympathetic system of nerves. There can be no doubt that some nerve tubes run into the ganglionic corpuscles, whilst others originate from them. (Wagner, Kölliker). It is even now rendered certain that the same ganglionic corpuscle may receive and give off nerve tubes, each having distinct properties, the one of conveying the influence of impressions to, and the other of conveying influences from, the nervous centres. The peripheral termination of the nerves is in loops or arcs.

The general arrangement of the two kinds of structures should be known. By cerebrum, or brain proper, ought to be understood that part of the encephalon constituting the cerebral lobes, situated above and outside the corpus callosum; by the spinal cord, all the parts situated below this great commissure, consisting of corpora striata, optic thalami, corpora quadrigemina, cerebellum, pons varolii, medulla oblongata, and medulla spinalis. In this way, we have a cranial and a vertebral portion of the spinal cord.

In the cerebrum, or brain proper, the ganglionic or corpuscular structure is external to the fibrous or tubular. It presents on the surface numerous anfractuosities, whereby a large quantity of matter is capable of being contained in a small space. This crumpled up sheet of grey substance has been appropriately called the hemispherical ganglion. (Solly). In the cranial portion of the spinal cord, the grey matter exists in masses, constituting a chain of ganglia at the base of the encephalon, more or less connected with each other and with the white matter of the brain proper above, and the vertebral portion of the cord below. In this last part of the nervous system the grey matter is internal to the white, and assumes the form of the letter *x*, having two posterior and two anterior cornua,—an arrangement which allows the latter to be distributed in the form of nerve tubes to all parts of the frame.

The white tubular structure of the vertebral portion of the cord is divided by the anterior and posterior horns of grey matter, together with the anterior and posterior sulci, into three divisions or columns on each side. On tracing these upwards into the medulla oblongata, the anterior and middle ones may be seen to decussate there with each other, whilst the posterior columns do not decussate. On tracing the columns up into the cerebral lobes, we observe that the anterior, or pyramidal tracts, send off a bundle of fibres, which passes below the olivary body, and is lost in the cerebellum—(*Arciform band* of Solly). The principal portion of the tract passes through the corpus striatum, and anterior portion of the optic thalamus, and is ultimately lost in the white substance of the cerebral hemispheres. The middle column, or olivary tract, may be traced through the substance of the optic thalamus and corpora quadrigemina, to be in like manner lost in the cerebral hemispheres. The posterior column, or restiform tract, passes almost entirely to the cerebellum.

In addition to the diverging fibres in the cerebral hemispheres which may be traced from below upwards, connecting the hemispherical ganglion with the structures below, the brain proper also possesses bands of transverse fibres, constituting the commissures connecting the two hemispheres of the brain together, as well as longitudinal fibres connecting the anterior with the posterior lobes. In the spinal cord it results from the investigations of Lockart Clarke that there is a decussation of various bundles of fibres throughout its whole extent. It is now also determined, that many of the fibres in the nerves may be traced directly into the grey substance of the cord—a fact originally stated by Grainger, but confirmed by Budge and Kölliker. Further, it has recently been shewn that by means of these fibres an anastomosis is kept up between the various columns, even those on both sides of the cord, through the medium of nerve cells in the grey matter, an important fact principally demonstrated by the labours of Stilling, Remak, Van der Kolk, Schilling, Kupffer, and Owsjannikow.

These later observations indeed open up to us the probability that the numerous actions hitherto called reflex, are truly direct and are carried on by a series of nervous filaments running in different directions, which have yet to be described. There can be no doubt that they pass and operate through the cord, and hence the term *diastaltic* proposed by Marshall Hall instead of reflex, is in every way more appropriate. The importance of this view appears to me so great, that I would refer to the accompanying figures from the Thesis of Owsjannikow,* showing the connection of the nerves and ganglionic cells in the spinal cord of certain fishes, as indicative of probable similar relations yet to be discovered in man.

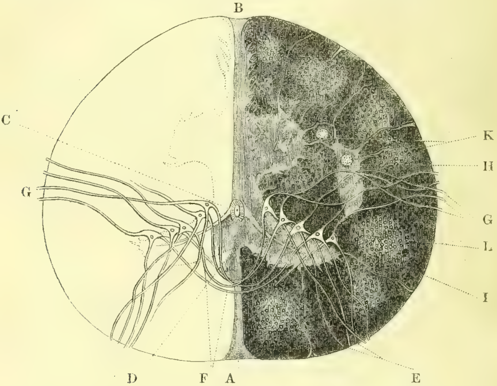

Fig. 87.

Functions of the Nervous System.—The great difference in structure existing between the grey and white matter of the nervous system, would *à priori* lead to the supposition that they performed separate functions. The theory at present entertained on this point is, that, while the grey matter eliminates or evolves nervous power, the white matter simply conducts to and from this ganglionic structure the influences which are sent or originate there.

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* Disquisitiones microscopicæ de medullæ spinalis textura, 1854.

Fig. 87. Transverse section of the spinal cord of the *Salmo salaris*. about two inches from the brain.—A, anterior; B, posterior groove; C, central canal lined with epithelium; D, areolar tissue surrounding the central canal, continuous with the anterior and posterior grooves; E, anterior root; F, commissural fibres; G, posterior root; H, areolar tissue; I, vertical fibres of the white substance cut across in the transverse section; K, openings of blood-vessels cut across; L, ganglionic cells.—(*Owsjannikow.*) 100 *diam.*

The brain proper furnishes the conditions necessary for the manifestation of the intellectual faculties properly so called, of the emotions and passions, of volition, and is essential to sensation. That the evolution of the power especially connected with mind is dependent on the hemispherical ganglion is rendered probable by the following

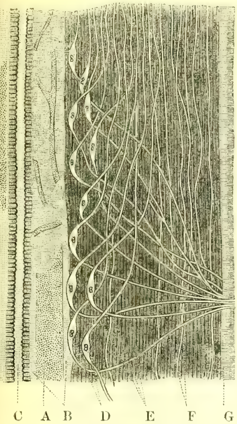

Fig. 88.

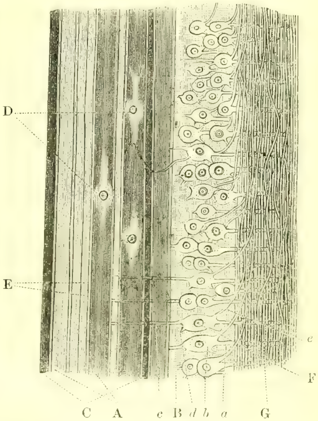

Fig. 89.

Fig. 88. Longitudinal section of the spinal cord of the *Salmo salaris*, cut obliquely from before inwards, in the course of the fibres of the anterior root.—A, blood-vessels filled with blood corpuscles; B, areolar texture; C, central canal; D, ganglionic cells; E, fibres of the white substance originating in the cells and going to the brain; F, fibres of the anterior root which pass through the white substance and pass into the cells; G, pia mater.—(*Owsjannikow.*) 100 *diam.*

Fig. 89. Longitudinal section of the spinal cord of the *Petromyzon fluviatilis*. The right half.—A, areolar tissue between the broad fibres of the cord; B, areolar tissue between the ganglionic cells, which exist in large numbers; C, broad fibres; D, bipolar ganglionic cells on a level with the broad fibres, the extremities of which divide into a countless number of minute branches. The upper one is seen to communicate with a spindle-shaped cell by a continuous fibre; E, fibres of medium width; F, spindle-shaped ganglionic cells, containing a nucleus and nucleolus; G, longitudinal fibres of the white substance, passing upwards; *a*, a fibre going from the cell into the posterior root; *b*, a fibre cut across which passes into the anterior root; *c*, commissural fibre; *d*, a fibre very difficult to follow, which was once seen to communicate with a round ganglionic cell in the centre of the cord; *e*, a fibre passing out of the cell and running upwards.—(*Owsjannikow.*) 100 *diam.*

facts :—1. In the animal kingdom generally, a correspondence is observed between the quantity of grey matter, depth of convolutions, and the sagacity of the animal. 2. At birth, the grey matter of the cerebrum is very defective, so much so, indeed, that the convolutions are, as it were, in the first stage of their formation, being only marked out by superficial fissures almost confined to the surface of the brain. As the cineritious substance increases, the intelligence becomes developed. 3. The results of experiments by Flourens, Rolando, Hertwig, and others, have shewn that, on slicing away the brain, the animal becomes more dull and stupid in proportion to the quantity of cortical substance removed. 4. Clinical observation points out, that in those cases in which the disease has been afterwards found to commence at the circumference of the brain and proceed towards the centre, that the mental faculties are affected *first;* whereas in those diseases which commence at the central parts of the organ and proceed towards the circumference, they are affected *last.*

The white tubular matter of the brain proper serves, by means of the diverging fibres, to conduct the influences originating in the hemispherical ganglion to the nerves of the head and trunk, whilst they also conduct the influence of impressions made on the trunk, in an inverse manner, up to the cerebral convolutions. The other transverse and longitudinal fibres which connect together the two hemispheres, and various parts of the hemispherical ganglion, are probably subservient to that combination of the mental faculties which characterises thought.

The spinal cord, both in its cranial and vertebral portions, furnishes the conditions necessary for combined movements; and that the nervous power necessary for this purpose depends upon the grey matter, is rendered probable by the following facts :—1st, Its universal connection with all motor nerves. 2d, Its increased quantity in those portions of the spinal cord from whence issue large nervous trunks. 3d, Its collection in masses at the origin of such nerves in the lower animals as furnish peculiar organs requiring a large quantity of nervous power, as in the triglia volitans, raia torpedo, silurus, etc. 4th, Clinical observation points out that, in cases where the central portion of the cord is affected previous to the external portion, an individual retains the sensibility of, and power of moving, the limbs, but wants the power to stand, walk, or keep himself erect, when the eyes are shut; whereas, when diseases commence in the meninges of the cord or externally—pain, twitchings, spasms, numbness, or paralysis, are the symptoms present, dependent on lesion of the white conducting matter.

The white matter of the cord acts as a conductor, in the same manner that it does in the brain proper, and there can be no doubt that the influence arising from impressions is carried not only along the fibres, formerly noticed, which connect the brain and two portions of the spinal cord together, but along those more recently discovered, which decussate or anastomose in the cord itself (Brown-Sequard), and are connected with the ganglionic cells of the grey matter.

The various nerves of the body consist for the most part of nerve tubes, running in parallel lines. Yet some contain ganglionic corpuscles, as the olfactory and the ultimate expansion of the optic and auditory nerves, whilst the sympathetic nerve contains in various places, not only ganglia, but gelatinous flat fibres. The posterior roots of the spinal nerves possess a ganglion, the function of which is quite unknown. These roots are connected with the posterior horn of grey matter in the cord, while the anterior roots are connected with the anterior horns. As regards function, the nerves may be considered as —1st, Nerves of special sensation, such as the olfactory, optic, auditory, part of the glosso-pharyngeal and lingual branch of the fifth. 2d, Nerves of common sensation, such as the greater portion of the fifth, and part of the glosso-pharyngeal. 3d, Nerves of motion, such as the third, fourth, lesser division of the fifth, sixth, facial, or portio dura of the seventh, and the hypo-glossal. 4th, Senso-motory or mixed nerves, such as the pneumo-gastric, the accessory, and the spinal nerves, 5th, Sympathetic nerves, including the numerous ganglionic nerves of the head, thorax, and abdomen,—the exact function of which has not been determined, although they seem to influence nutrition and the production of animal heat, through their connection with the blood-vessels.

All nerves are endowed with a peculiar vital property called sensibility, inherent in their structure, by virtue of which they may be excited on the application of appropriate stimuli, so as to transmit the influence of the impressions they receive to or from the brain, spinal cord, or certain ganglia, which may be considered as nervous centres. The nerves of special sensation convey *to* their nervous centres the influence of impressions caused by odoriferous bodies, by light, sound, and by sapid substances. The nerves of common sensation convey the influence of impressions *to* their nervous centres, caused by mechanical or chemical substances. The nerves of motion carry *from* the nervous centres the influence of impressions whether psychical or physical. (Todd.) The mixed nerves carry the influence of stimuli both to and from, combining in themselves the functions of common sensation and of motion. Although the sympathetic nerves also undoubtedly carry the influences of impressions, the direction of these cannot be ascertained, from their numerous anastomoses, as well as from the ganglia scattered over them, all of which act as minute nervous centres. But there *are* cases where certain psychical stimuli (as the emotions) act on organs through these nerves, and where certain diseases (as colic, gallstones, etc.) excite through them sensations of pain.

Sensation may be defined to be *the consciousness of an impression*, and that it may take place, it is necessary,—1st, That a stimulus should be applied to a sensitive nerve, which produces an impression; 2d, That, in consequence of this impression, a something should be generated, we designate an influence, which influence is conducted along the nerve to the hemispherical ganglion; 3d, On arriving there, it calls into action that faculty of the mind called consciousness or perception, and sensation is the result. It follows that sensation may be lost by any circumstance which destroys the sensibility of the nerve to impressions;—which impedes the process of conducting the influence generated by these impressions, or, lastly, which renders the mind unconscious of them. Illustrations of how sensation may be affected in all these ways must be familiar to you, from circumstances influencing the ultimate extremity of a nerve, as on exposing the foot to cold,—from injury to the spinal cord, by which the communication with the brain is cut off, or from the mind being inattentive, excited, or suspended.

The independent endowment of nerves is remarkably well illustrated by the fact, that whatever be the stimulus which calls their sensibility into action, the same result is occasioned. Mechanical, chemical, galvanic, or other *physical* stimuli, when applied to the course or the extremities of a nerve, cause the very same results as may originate from suggestive ideas, perverted imagination, or other *psychical* stimuli. Thus a chemical irritant, galvanism, or pricking and pinching a nerve of motion, will cause convulsion and spasms of the muscles to which it is distributed. The same stimuli applied to a nerve of common sensation will cause pain, to the optic nerve flashes of light, to the auditory nerve ringing sounds, and to the tip of the tongue peculiar tastes. Again, we have lately had abundant opportunities of seeing that suggestive ideas, or stimuli arising in the mind, may induce peculiar effects on the muscles, give rise to pain or insensibility, and cause perversion of all the special senses.—(See Diseases of the Nervous System).

Motion is accomplished through the agency of muscles, which are endowed with a peculiar vital property, called contractility, in the same way that nerve is endowed with the property of sensibility. Contractility may be called into action altogether independent of the nerves (Haller), as by stimulating an isolated muscular fasciculus directly. (Weber.) It may also be excited by a physical or psychical stimuli, operating through the nerves. *Physical* stimuli (as pricking, pinching, galvanism, etc.) applied to the extremities or course of a nerve, may cause convulsions of the parts to which the motor filaments are distributed directly, or they may induce combined movements in other parts of the body *diastaltically* (Marshall Hall),—that is, through the spinal cord. In this latter case the following series of actions take place :—1st, The influence of the impression is conducted to the spinal cord by the afferent or *esodic* filaments which enter the grey matter. 2d, A motor influence is transmitted outwards by one or more efferent or *exodic* nerves. 3d, This stimulates the contractility of the muscles to which the latter are distributed, and motion is the result. Lastly, contractility may be called into action by *psychical* stimuli or mental acts—such as by the will and by certain emotions. Integrity of the muscular structure is necessary for contractile movements; of the spinal cord, for diastaltic or reflex movements; and of the brain proper, for voluntary or emotional movements.[*]

Thus, then, we may consider that the brain acting alone furnishes the conditions necessary for intelligence; the spinal cord acting alone furnishes the conditions essential for the co-ordinate movements necessary to the vital functions; and the brain and spinal cord acting together furnish the conditions necessary for voluntary motion and sensation.

The following aphorisms will be found useful, in endeavouring to reason correctly on the functions of the nervous system:—

1. The brain proper is that portion of the encephalon situated above the Corpus Callosum.

2. The spinal cord is divided into a cranial and a vertebral portion.

3. The grey matter evolves and the white conducts nervous power.

4. *Contractility* is the property peculiar to fibrous texture, whereby it is capable of shortening its fibres. Motion is of three kinds, *contractile*, dependent on muscle—*diastaltic*, dependent on muscle and spinal cord—*voluntary*, dependent on muscle, spinal cord, and brain.

5. *Sensibility* is the property peculiar to nervous texture, whereby it is capable of receiving impressions. *Sensation* is the consciousness of receiving such impressions.

A more detailed account of the various cerebral, spinal, and cerebrospinal functions, as they are performed separately or conjointly,

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[*] Diagram illustrative of voluntary and reflex motions. Fig. 90 refers to voluntary motion and sensation. The first originates in a *psychical* stimulus, the will, in the hemispherical ganglion, the influence of which is propagated downwards through the fibres of the brain, *a*, to the spinal cord, and outwards by a motor filament in a compound nerve, *b*, to the muscles. The last originates in a *physical* stimulus, say the prick of a needle, at the extremity of the nerve, *b*, the influence of which travels in the opposite direction, along a sensitive filament of that compound nerve, through the spinal cord, up to the hemispherical ganglion, there exciting the mental act consciousness, and as a result sensation. In both cases the nerve fibres are continuous.

Fig. 91 explains reflex or more properly diastaltic motions (δια, through, ςτελλω, I contract.) They originate in a physical stimulus applied to the extremity of a sensitive filament, *a*, the influence of which travels inwards to the spinal cord, and through its grey matter again outwards along a motor filament, *b*, to the muscles, without necessarily being propagated to the hemispherical ganglion, and thereby exciting consciousness and sensation. The nature of the communication through the grey matter instead of being broken or reflected, we have seen to be probably continuous and direct through the medium of ganglionic cells. (Fig. 87.)

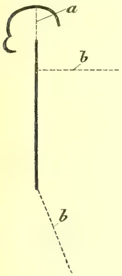

Fig. 90.

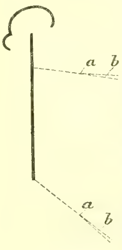

Fig. 91.

belongs to the course of the Institutes of Medicine, and with these you are supposed to be familiar. It is important, however, that we dwell more at length on the

General Pathology of the Nervous System.

For the purposes of diagnosis and treatment, it is a matter of great importance to attend to the following pathological laws which regulate diseased action of the nervous centres.

(1.) *The amount of fluids within the cranium must always be the same so long as its osseous walls are capable of resisting the pressure of the atmosphere.* There are few principles in medicine of greater practical importance than the one we are about to consider,—the more so, as many able practitioners have lately abandoned their former opinions on this head, and on what I consider to be very insufficient grounds. On this point, therefore, I cannot do better than condense and endeavour to put clearly before you the forcible arguments of the late Dr. John Reid, with such other considerations as have occurred to myself.

That the circulation within the cranium is different from that in other parts of the body, was first pointed out by the second Monro. It was tested experimentally by Dr. Kellie of Leith, ably illustrated by Dr. Abercrombie, and successfully defended by Dr. John Reid. The views adopted by these distinguished men were, that the cranium forms a spherical bony case capable of resisting the atmospheric pressure, the only openings into it being the different foramina by which the vessels, nerves, and spinal cord pass. The encephalon, its membranes, and blood-vessels, with perhaps a small portion of the cerebro-spinal fluid, completely fill up the interior of the cranium, so that no substance can be dislodged from it without some equivalent in bulk taking its place. Dr. Monro used to point out, that a jar, or other vessel similar to the cranium, with unyielding walls, if filled with any substance, cannot be emptied without air or some substance taking its place. To use the illustration of Dr. Watson, the contents of the cranium are like beer in a barrel, which will not flow out of one opening unless provision be made at the same time that air rushes in. The same kind of reasoning applies to the spinal canal, which, with the interior of the cranium, may be said to constitute one large cavity, incompressible by the atmospheric air.

Before proceeding further, we must draw a distinction between pressure on, and compression of, an organ. Many bodies are capable of sustaining a great amount of pressure without undergoing any sensible decrease in bulk. By compression must be understood, that a substance occupies less space from the application of external force, as when we squeeze a sponge, or compress a bladder filled with air. Fluids generally are not absolutely incompressible, yet it requires the weight of one atmosphere, or fifteen pounds in the square inch, to produce a diminution equal to $\frac{1}{20\cdot000}$th part of the whole. Now this is so exceedingly small a change upon a mass equal in bulk to the brain, as not to be appreciable to our senses. Besides, the pressure on the internal surface of the blood-vessels never exceeds ten or twelve pounds on the square inch, during the most violent exertion, so that, under no possible circumstances, can the contents of the cranium be diminished even the $\frac{1}{20\cdot000}$th part. When the brain is taken out of the cranium, it may, like a sponge, be compressed, by squeezing fluid out of the blood-vessels; but during life, surrounded, as it is, by unyielding walls, this is impossible. For let us, with Abercrombie, say, that the whole quantity of blood circulating within the cranium is equal to 10, that is 5 in the veins, and 5 in the arteries; if one of these be increased to 6, the other must be diminished to 4, so that the same amount, 10, shall always be preserved. It follows, that when fluids are effused, blood extravasated, or tumours grow within the cranium, a corresponding amount of fluid must be pressed out, or of brain absorbed, from the physical impossibility of the cranium holding more matter. At the same time, it must be evident that an increased or diminished amount of pressure may be exerted *on* the brain, proportioned to the power of the heart's contraction, the effect of which will be, not to alter the amount of fluids within the cranium, but to cause, using the words of Abercrombie, "a change of circulation" there. This is all, it seems to me, that is shown by the ingenious experiments of Donders, who saw venous congestion through glass plates, fixed in the crania of rabbits.*

Dr. Kellie performed numerous experiments on cats and dogs, in order to elucidate this subject. Some of these animals were bled to death by opening the carotid or femoral arteries, others by opening the jugular veins. In some the carotids were first tied, to diminish the quantity of blood sent to the brain, and the jugulars were then opened, with the view of emptying the vessels of the brain to the greatest possible extent; while, in others, the jugulars were first secured, to prevent as much as possible the return of the blood from the brain, and one of the carotids was then opened. He inferred, from the whole inquiry, which was conducted with extreme care, "That we cannot, in fact, lessen, to any considerable extent, the quantity of blood within the cranium by arteriotomy or venesection; and that when, by profuse hæmorrhages destructive of life, we do succeed in draining the vessels within the cranium of any sensible portion of red blood, there is commonly found an equivalent to this spoliation in the increased circulation or effusion of serum, serving to maintain the plenitude of the cranium."

Dr. Kellie made other experiments upon the effects of position immediately after death from strangulation or hanging. He also removed a portion of the unyielding walls of the cranium in some animals, by means of a trephine, and then bled them to death; and the differences between the appearances of the brain in these cases, and in those where the cranium was entire, were very great. One of the most remarkable of these differences was its shrunk appearance, in those animals in which a portion of the skull was removed, and the air allowed to gravitate upon its inner surface. He says :—"The brain was sensibly depressed below the cranium, and a space left, which was found capable of containing a teaspoonful of water."

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* Nederlandeche.—Lancet, 1850.

It results from these inquiries, that there must always be the same amount of fluids within the cranium so long as it is uninjured. In morbid conditions these fluids may be blood, serum, or pus; but in health, as blood is almost the only fluid present (the cerebro-spinal fluid being very trifling), its quantity can undergo only very slight alterations. There are many circumstances, however, which occasion local congestions in the brain, and consequently unequal pressure on its structure, in which case another portion of its substance must contain less blood, so that the amount of the whole, as to quantity, is always preserved. These circumstances are mental emotions, hæmorrhages, effusions of serum, and morbid growths. Such congestions, or local hyperhemias, in themselves constitute morbid conditions; and nature has, to a great extent, provided against their occurrence under ordinary circumstances, by the tortuosity of the arteries and the cerebro-spinal fluid, described by Magendie.

The views now detailed had been very extensively admitted into pathology, when Dr. Burrows, of St. Bartholomew's Hospital, endeavoured to controvert them, first in the Lumleian lectures of 1843, and subsequently in a work published in 1846, entitled, "On Disorders of the Cerebral Circulation, and on the Connection between Affections of the Brain and Diseases of the Heart." Dr. Burrows, however, evidently misunderstood the doctrine we are advocating. Thus, he is always combating the idea that blood-letting, position, strangulation, etc., cannot affect the *blood in the brain;* whereas the real proposition is, that they cannot alter the *fluids within the cranium.* By thus confounding blood with fluid, and brain with cranium, he has only contrived to overthrow a doctrine of his own creation.

Dr. Burrows has brought forward several observations and experiments, which he considers opposed to the theory now advocated. His facts are perfectly correct. I myself have repeated his experiments on rabbits, and can confirm his descriptions. It is the inferences he draws from them that are erroneous. For the paleness which results from hæmorrhage, and the difference observable in the colour of the brain, when animals, immediately after death, are suspended by their ears or by their heels, is explicable by the diminished number of coloured blood particles in the one case, and by their gravitation downwards in the other. That the amount of fluid within the cranium was in no way affected, is proved by the plump appearance of the brains figured by Dr. Burrows, and the total absence of that shrunken appearance so well described by Dr. Kellie.

Neither does our observation of what occurs in asphyxia or apnœa, oppose the doctrine in question, as Dr. Burrows imagines, but rather confirms it. On this point the following observations by Dr. John Reid are valuable. He says:—"If any circumstance could produce congestion of the vessels within the cranium, it would be that of death by hanging; for then the vessels going to and coming from the brain are, with the exception of the vertebral arteries, compressed and then obstructed. These two arteries, which are protected by the peculiarity of their course through the foramina of the transverse processes of the cervical vertebræ, must continue for a time to force their blood upon the brain, while a comparatively small quantity only can escape by the veins. Indeed, the greater quantity of blood carried to the encephalon by the vertebrals returns by the internal jugulars, and not by the vertebral veins, which are supplied from the occipital veins of the spinal cord; and the anastomoses, between the cranial and vertebral sinuses, could carry off a small quantity of the blood only, transmitted along such large arteries as the vertebrals. And yet it is well known that there is no congestion of the vessels within the cranium after death by hanging, however gorged the external parts of the head may be by blood and serum." This is admitted by Dr. Burrows, although he endeavours to get rid of so troublesome a fact by a gratuitous hypothesis, which will not bear a moment's examination, but for the refutation of which I must refer to the works of Dr. Reid.*

On the whole, whether we adopt the terms of local congestion, of change of circulation within the cranium (Abercrombie), or of unequal pressure (Burrows), our explanation of the *pathological* phenomena may be made equally correct, because each of these modes of expression implies pretty much the same thing. But if we imagine that venesection will enable us to diminish the amount of blood in the cerebral vessels, the theory points out that this is impossible, and that the effects of bleeding are explained by the influence produced on the heart, the altered pressure on the brain, exercised by its diminished contractions, and the change of circulation within the cranium thereby occasioned.

I have entered somewhat fully into this theory, because, independent of its vast importance in a practical point of view, it is one which originated in the Edinburgh School of Medicine. Singular to say, notwithstanding the obvious errors and fallacies in Dr. Burrows' work, no sooner did it appear, than the whole medical press of England and Ireland adopted its conclusions, and even Dr. Watson, in the last edition of his excellent work, also abandoned the theory of Monro, Kelly, and Abercrombie. But so far is this theory concerning the circulation within the cranium from being shaken by the attack of Dr. Burrows, that it may be said now to stand on a firmer basis than ever, owing to that attack having drawn forth the convincing reasoning and unanswerable arguments of so sound an anatomist, physiologist, and pathologist as the late Dr. John Reid.

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* Physiological, Anatomical, and Pathological Researches, No. XXV.

(2.) *All the functions of the nervous system may be increased, perverted, or destroyed, according to the degree of stimulus or disease operating on its various parts.*—Thus, as a general rule, it may be said, that a slight stimulus produces increased or perverted action; whilst the same stimulus, long continued or much augmented, causes loss of function. All the various stimuli, whether mechanical, chemical, electrical, or psychical, produce the same effects, and in different degrees. Circumstances influencing the heart's action, stimulating drinks or food, act in a like manner. Thus, if we take the effects of alcoholic drink, for the purpose of illustration, we observe that, as regards combined movements, a slight amount causes increased vigour and activity in the muscular system. As the stimulus augments in intensity, we see irregular movements occasioned, staggering, and loss of control over the limbs. Lastly, when the stimulus is excessive, there is complete inability to move, and the power of doing so is temporarily annihilated. With regard to sensibility and sensation, we observe cephalalgia, tingling, and heat of skin, tinnitus aurium, confusion of vision, muscæ volitantes, double sight, and lastly, complete insensibility and coma. As regards intelligence, we observe at first rapid flow of ideas, then confusion of mind, delirium, and lastly, sopor and perfect unconsciousness. In the same manner pressure, mechanical irritation, and the various organic diseases, produce augmented, perverted, or diminished function, according to the intensity of the stimulus applied, or amount of structure destroyed.

Then it has been shewn, that excess or diminution of stimulus, too much or too little blood, very violent or very weak cardiac contractions, and plethora or extreme exhaustion, will, so far as the nervous functions are concerned, produce similar alterations of motion, sensation, and intelligence. Excessive hæmorrhage causes muscular weakness, convulsions, and loss of motor power, perversions of all the sensations, and lastly, unconsciousness from syncope. Hence the general strength of the frame cannot be judged of by the nervous symptoms, although the treatment of these will be altogether different, according as the individual is robust or weak, has a full or small pulse, etc. These similar effects on the nervous centres from apparently such opposite exciting causes, can, it seems to me, only be explained by the peculiarity of the circulation previously noticed. A change of circulation within the cranium takes place, and whether arterial or venous congestion occurs, pressure on some portion of the organ is equally the result. The importance of paying attention to this point in the treatment must be obvious.

(3.) *The seat of the disease in the nervous system influences the nature of the phenomena or symptoms produced.*—It is a matter of very great importance to ascertain how far certitude in diagnosis may be arrived at, and the seat of the disease ascertained. On this subject it may be affirmed that, although clinical observation combined with pathology has done much, more requires to be accomplished. As a general rule, it may be stated, that disease or injury of one side of the encephalon, especially influences the opposite side of the body. It is said that some very striking exceptions have occurred to this rule, but these at any rate are remarkably rare. Besides, it has always appeared to me probable that, inasmuch as extensive organic disease, if occurring slowly, may exist without producing symptoms, whilst it is certain most important symptoms may be occasioned without organic disease, even these few exceptional cases are really not opposed to the general law. Then, as a general rule, it may be said that diseases of the brain proper are more especially connected with perversion and alteration of the intelligence; whilst disease of the cranial portion of the spinal cord and base of the cranium, are more particularly evinced by alterations of sensation and motion. In the vertebral portion of the cord, the intensity of pain and of spasm, or want of conducting power, necessary to sensation and voluntary motion, indicates the amount to which the motor and sensitive fibres are affected. Further than this we can scarcely generalise with prudence, although there are some cases, as we shall subsequently see, where careful observation has enabled us to arrive at more positive results.

The fatality of lesions affecting various parts of the nervous centres varies greatly. Thus the hemispheres may be extensively diseased, often without injury to life, or even permanent alteration of function. Convulsions and paralysis are the common results of disease of the ganglia, in the cranial portion of the cord. The same results from lesion of the pons varolii. But if the medulla oblongata, where the eighth pair originates, be affected, or injury to this centre itself occur, it is almost always immediately fatal.

(4.) *The rapidity or slowness with which the lesion occurs influences the phenomena or symptoms produced.* It may be said as a general rule, that a small lesion, for instance, a small hæmorrhagic extravasation, occurring suddenly, and with force, produces, even in the same situation, more violent effects than a very extensive organic disease which comes on slowly. This, however, will depend much upon the seat of the lesion. Very extraordinary cases are on record, where large portions of the nervous centres have been much disorganized, without producing anything like such violent symptoms as have been occasioned at other times by a small extravasation in the same place. Here again the nature of the circulation within the cranium offers the only explanation, for the encephalon must undergo a certain amount of pressure, if no time be allowed for it to adapt itself to a foreign body;

whereas any lesion coming on slowly enables the amount of blood in the vessels to be diminished according to circumstances, whereby presure is avoided.

(5.) *The various lesions and injuries of the nervous system produce phenomena similar in kind.*—The injuries which may be inflicted on the nervous system, as well as the morbid appearances discovered after death, are various. For instance, there may be an extravasation of blood, exudation of lymph, a softening, a cancerous tumour, or tubercular deposit, and yet they give rise to the same nervous phenomena, and are modified only by the circumstances formerly mentioned, of degree, seat, suddenness, etc. Certain nervous phenomena also are of a paroxysmal character, whilst the lesions supposed to occasion them are stationary or slowly increasing. It follows, that the effects cannot be explained by the nature of the lesions, but to something which they all have in common; and this, it appears to me, may consist of—1st, Pressure with or without organic change; 2d, More or less destruction or disorganisation of nervous texture. Further, when we consider that the same nervous symptoms arise from irregularities in the circulation; from increased as well as diminished action; sometimes when no appreciable change is found, as well as when disorganisation has occurred—the theory of local congestions to explain functional alterations of the nervous centres seems to me the most consistent with known facts. That such local congestions do frequently occur during life, without leaving traces detectable after death, is certain; whilst the occurrence of molecular changes, or other hypothetical conditions which have been supposed to exist, have never yet been shewn to take place under any circumstances.

While such appear to me to be some of the generalizations which are important to the physician with regard to the nutritive and nervous functions, viewed separately, it should never be forgotten that he has constantly to do with their conjoint action. Indeed, the derangement of one order of functions exercises a constant influence over the other, so that in every disease the effects of disordered nutrition are visible in perverted innervation, and the contrary. Thus an improper quantity or quality of food produces sometimes excitement, at others dulness of intellect. Various articles of diet have been known to cause violent headache, and different kinds of nervous phenomena, while starvation, if long continued, excites delirium, paroxysms of mania, and lastly, stupor. In children, derangement of the alimentary canal is the most common cause of spasm and convulsion, and in the aged often leads to apoplexies and palsy. Again, impeded respiration, poverty of the blood, accumulation of effete matters in the system, suppressed secretions and obstructed excretions, are all accompanied or followed by disorders of innervation. On the other hand, the influence of the nervous system on nutrition is equally apparent. Syncope and even death itself have been occasioned by mental emotions. Anxiety and suppressed grief predispose to diseases of the stomach, and thereby to altered nutrition, terminating in various maladies. The reception of joyful or distressing intelligence, it is well known, invigorates or depresses the bodily energies. Various organs are excited to action by particular trains of thought or desires, and the countenance is reddened by modesty, and blanched by fear. As a general rule, it may be said, while slight emotions increase the secretions, very violent ones, particularly if suppressed, completely suspend them, and are most dangerous to life.* Direct mechanical injury to the large nervous trunks, in addition to causing paralysis, is now recognised in some cases to produce increased heat and redness in parts, often followed by exudation and ulceration. In chronic cases, such paralysis leads to atrophy, and withering of a limb, or some other portion of the body. Very rarely, injury of a great sympathetic trunk produces similar loss of nutrition without impairment of sensibility or motion, of which the most remarkable example I am acquainted with is recorded by Professor Romberg of Berlin. It was that of an unmarried woman, aged 28, who, as the result of extensive suppuration on the left side of the neck, which

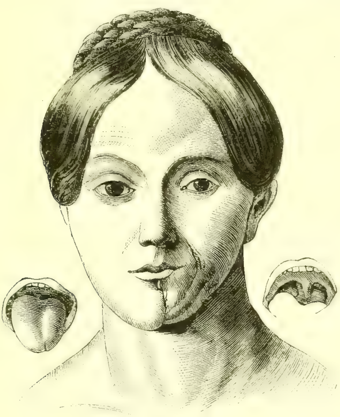

Fig. 92.

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* "Give sorrow words; the grief that will not speak,
Whispers the o'erfraught heart, and bids it break."—*Shakspeare.*

Fig. 92. Remarkable atrophy of the left side of the face, in a woman aged 28, without loss of sensibility or motion in the affected parts.—(*Romberg.*)

burst through the tonsil, found the features on the corresponding side of the face gradually become atrophied, without any diminution of sensibility or motion. Looking at the two halves of the face separately, it appeared as if the one belonged to a young, and the other to an old woman. By some it was supposed that the diseased side was sound, and that the other was swollen. The hair, eyebrows, and eyelashes were very thin on the affected side, and she was in the habit of dividing her hair towards the right, so as to equalise the quantity. Every feature, including the brow, eye, nostril, lips, cheek, and chin, as well as the left half of the tongue and left palatine arch were smaller than those on the opposite one.*

Further illustrations of the general principles now detailed will be constantly met with under the head of special diseases.

SIMPLE, CANCEROUS AND TUBERCULAR EXUDATIONS—THEIR PATHOLOGY AND GENERAL TREATMENT.

There are three varieties of exudation, which, occurring as they do in one or other of the textures, occasion the great majority of those diseases we shall be called upon to treat. A knowledge of the manner in which these are produced, the characters of each, their specific differences and natural progress, constitute the foundation of modern medicine. I propose, then, describing them to you generally, before directing your attention to the special peculiarities they present in individual cases.

The term exudation has been introduced into pathology, not only to express the act of the liquor sanguinis passing through the vascular walls, but to denominate the fibrinous portion of the liquor sanguinis itself, when it has coagulated on the surface, or in the substance of any tissue or organ of the body. This term meets a difficulty† which morbid anatomists have long experienced; and hence it has of late years been extensively used to signify various kinds of morbid deposits. Thus it has been applied to all those processes hitherto termed inflammatory, tubercular, and cancerous; it may be associated with every form of morbid growth; it often gives rise to concretions, and frequently constitutes the soil for parasitic vegetations or cryptogamic plants of a low type, which communicate essential characters to certain diseases. Indeed exudation, as a morbid process, comprises the greater part of organic, as distinguished from functional diseases; of lesions of nutrition, as separated from lesions of innervation.

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* Klinische Ergebnisse. Berlin, 1846.

† Of inflammation, Andral says, "created in the infancy of science, this expression, altogether metaphorical, was destined to represent a morbid state, in which the parts appeared to burn, to be inflamed, etc. Received into general language without any precise idea having ever been attached to it, in the triple relation of symptoms which announce it, of the lesions which characterize it, and of its intimate nature, the expression inflammation is become so very vague, its interpretation is so very arbitrary, that it has really lost its value; it is like an old coin without an impression, which ought to be removed from circulation, as it only causes error and confusion." On the other hand, exudation of the liquor sanguinis is a demonstrative fact, and gives rise to a definite idea. Hence, for all scientific and practical purposes, the expression "exudation" may be substituted for that of inflammation.

I. Production of Exudation.

Exudation in every case results from a previous series of changes which has taken place in the capillary vessels, and blood contained in them. These changes, as we are enabled to follow them in the transparent parts of animals under the microscope, are seen to occur in the following order:—1st, The capillary vessels are narrowed, and the blood flows through them with greater rapidity. 2d, The same vessels become enlarged, and the current of blood is slower, although even. 3d, The flow of blood becomes irregular. 4th, All motion of the blood ceases, and the vessel appears fully distended. 5th and lastly, The liquor sanguinis is exuded through the walls of the vessel, sometimes accompanied by extravasation of blood corpuscles, owing to rupture of the capillaries.

The first step in the process, viz., narrowing of the capillaries, is readily demonstrated on the application of acetic acid to the web of the frog's foot. If the acid be weak, the capillary contraction occurs more slowly and gradually. If it be very concentrated, the phenomenon is not observed, or it passes so quickly into complete stoppage of blood, as to be imperceptible. Although we cannot see these changes in man under the microscope, certain appearances indicate that the same phenomena occur. The operations of the mind, for instance, as fear and fright, and the application of cold, produce paleness of the skin; an effect which can only arise from contraction of the capillaries, and a diminution of the quantity of blood they contain. In the majority of instances, also, this paleness is succeeded by increased redness, the same result as follows from direct experiment on the web of the frog's foot, constituting the second step of the process. In other cases, the redness may arise primarily from certain mental emotions, or from the application of heat. In either case it depends on the enlargement of the capillaries, and the greater quantity of blood they contain.*

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* It has been asserted that instead of contraction of the capillaries, the first changes observable are enlargement with an increased flow of blood. To determine positively the question of contraction or dilatation, I have recently made a series of careful observations on the web of a frog's foot. Having fixed the animal in such a way that it could not move, I carefully measured with Oberheuser's eye micrometer the diameter of various

The variation in the size of, and amount of blood in, the capillaries, is conjoined with changes in the movement of that fluid. Whilst the vessels are contracted, the blood may be seen to be flowing with increased velocity. After a time the blood flows more and more slowly, without, however, the vessel being obstructed : it then oscillates, that is, moves forwards and backwards, or makes a pause, evidently synchronous with the ventricular diastole of the heart. At length the vessel appears quite distended with yellow corpuscles, and all movement ceases.

Again, these changes in the movement of the blood induce variations in the relation which the blood corpuscles bear to each other, and to the wall of the vessel. In the natural circulation of the frog's foot, the yellow corpuscles may be seen rolling forward in the centre of the tube, whilst on each side a clear space is left, only filled with liquor sanguinis and a few lymph corpuscles. There are evidently two currents, the centre one very rapid, that at the sides (in the lymph spaces, as they are called), much slower. The coloured corpuscles are hurried forward in the first, occasionally mixed with some lymph corpuscles. These latter, however, may frequently be seen clinging to the sides of the vessel, or slowly proceeding a short distance down the tube in the lymph space, and then again stopping. Occasionally they get into the central torrent, when they start off with great velocity, and accompany the yellow corpuscles. It has been said that these corpuscles augment in number, accumulate in the lymph spaces, and obstruct the flow of blood. In young frogs their number is often very great ; but then they constitute a normal part of the blood, and in no way impede the circulation. In old frogs, on the other hand, all these, and subsequent changes, may be observed, without the presence of colourless corpuscles. When the capillaries enlarge, however, the central coloured column in the smaller vessels may be seen to enlarge also, and gradually approach the sides of the tube, thus encroaching on the lymph spaces. The slower the motion of the blood, the closer it comes, until at length the coloured corpuscles come in contact with the sides of the vessel, and are more or less compressed and changed in form. At length the vessel is completely distended with coloured corpuscles, the original form of which can no longer be discovered, and the tube appears to be

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vessels, before, during, and after the application of stimuli. The results were, that immediately hot water was applied, a vessel that measured 13 spaces of the eye micrometer contracted to 10; another that measured 10 contracted to 7; a third that measured 7 contracted to 5; a fourth, which was a capillary carrying blood globules in single file, and measured 5, was contracted to 4; and another one of the smallest size which measured 4 was contracted to 3. With regard to the ultimate capillaries, it was frequently observed that if filled with corpuscles, they contracted little, but if empty, the contraction took place from 4 to 2, so that no more corpuscles entered them, and they appeared obliterated. This was especially seen after the addition of acetic acid. It was also observed that minute vessels that contracted from 4 to 3, afterwards became dilated to 6 before congestion and stagnation occurred. The smaller veins were seen to contract as much as the arteries of the same size.

filled with a homogeneous deep crimson fluid. This is congestion. If the morbid process continue, the vessel may burst, causing hæmorrhage,

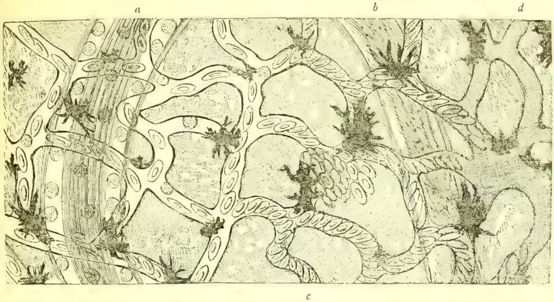

Fig. 93.

or the liquor sanguinis may transude through its walls, without rupture, into the surrounding texture. This last is exudation.

II. Theory of Exudation.

It is of the utmost importance in pathological inquiries to separate facts from theories. Our facts may be correct, although the conclusions derived from them are wrong. This proposition, however generally admitted, is seldom acted on; for in medical writings and statements we frequently find fact and hypothesis so mingled together,

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Fig. 93. An exact copy of a portion of the web in the foot of a young frog, after a drop of strong alcohol had been placed upon it. The view exhibits a deep-seated artery and vein, somewhat out of focus; the intermediate or capillary plexus running over them, and pigment cells of various sizes scattered over the whole. On the left of the figure, the circulation is still active and natural. About the middle it is more slow, the column of blood is oscillating, and the corpuscles crowded together. On the right, congestion, followed by exudation, has taken place.

a, A deep-seated vein, partially out of focus. The current of blood is of a deeper colour, and not so rapid as that in the artery. It is running in the opposite direction. The lymph space on each side, filled with slightly yellowish blood plasma, is very apparent, containing a number of colourless corpuscles, clinging to or slowly moving along the sides of the vessel.

b, A deep-seated artery, out of focus, the rapid current of blood allowing nothing to be perceived but a reddish, yellow broad streak, with lighter spaces at the sides.

Opposite *c*, laceration of a capillary vessel has produced an extravasation of blood, which resembled a brownish-red spot.

At *d*, congestion has occurred, and the blood corpuscles are apparently merged into one semitransparent, reddish mass, entirely filling the vessels. The spaces of the web, between the capillaries, are rendered thicker and less transparent, partly by the action of the alcohol, partly by the exudation. This latter entirely fills up the spaces, or only coats the vessel. 200 *diam.*

that it often requires considerable critical and analytical power to separate the one from the other. We are, however, in all cases, insensibly led to theorise—that is, to attempt an explanation of the phenomena observed, in order that we may derive from them some general principle for our guidance. Such speculation is always legitimate, so long as we consider opinions to be mere generalisations of known facts, and are ready to abandon them the moment other facts point them out to be erroneous. The phenomena of exudation, previously described, may easily be demonstrated—they constitute the *facts*. Let us now examine how they have been attempted to be explained—in other words, what is the *theory*.

1. The contraction and dilatation of the capillaries are explicable, by supposing them to be endowed with a power of contractility analogous to that existing in non-voluntary muscles. John Hunter thought they were muscular, from the results of his observations and experiments; and they may be shown by the histologist to consist of a delicate membrane, in which permanent nuclei are imbedded. In structure, then, they closely resemble the muscular fibres of the intestine, and we know that, like them, they may be contracted or dilated by emotions of the mind, that is through the nerves, or by local applications, that is directly. The narrowing of these tubes, therefore, may be considered, as Cullen thought it was, analogous to spasm, while their dilatation is similar either to the relaxation which follows such spasm, or to muscular paralysis. The recent observations of Cl. Bernard and others as to the effects produced by dividing the large nervous trunk of the sympathetic in the neck, have singularly confirmed this theory.

2. The rapid and slow movement of the blood is explicable on the hydraulic principle, that when a certain quantity of fluid is driven forward with a certain force through a pervious tube, and the tube is narrowed or widened, while the propelling force remains the same, the fluid must necessarily flow quicker in the first case and slower in the second. It has been supposed, from the throbbing of large vessels leading to congested parts, that they pump a larger quantity of blood than usual into them. This was called "determination of blood" by the older pathologists, and is now known not to be a cause, but a result, of the changes going on in the capillary vessels and tissues of the affected part. The oscillatory movement, seen later in the transparent parts of small animals, has not been observed in man, and probably depends, in the former, on a weakened power of the heart.

3. It is the stoppage of the blood, and exudation of the liquor sanguinis, however, which it is most difficult to explain; for why, so long as there is no mechanical obstruction (and during this process none has ever been seen) should the circulation through the capillaries of a part cease? It has been endeavoured, indeed, of late years, to establish a mechanical obstruction, by supposing the formation of colourless corpuscles, in large numbers, which cling to the sides of the

capillaries, and so cause interruption of the stream. But this hypothesis is negatived by the following facts:—1st, In young frogs the vessels may be seen to be crowded with colourless corpuscles, while the circulation is in no way affected. 2d, In old frogs, oscillation and gradual stoppage of the stream may be seen, without any colourless corpuscles being present. 3d, The colourless corpuscles, as shown by Remak, are increased, after large venesections, in the horse, without ever causing active congestion.* And, 4th, In Leucocythemia all the vessels are crowded with colourless corpuscles, and yet no active congestion in these vessels, nor exudation of any kind, has been occasioned. (See Leucocythemia).

We cannot ascribe the stoppage of the circulation in the capillaries to venous obstruction, or to mechanical pressure of any kind, because all observation proves that such causes, while they induce effusion of serum, never occasion exudation of liquor sanguinis. Neither can we suppose it to depend on endosmose, nor on a *vis a tergo*, as such physical causes cannot be shewn to apply in all cases. We are compelled, therefore, to attribute the vital force producing these changes, not to anything residing in the blood, or in the vessels, but to the tissues which lie outside the vessels. That these do possess a power attractive and selective, whereby matters are drawn from the blood to carry on nutrition and secretion, is now generally admitted in physiology. A modification of this power, whereby the attractive property is augmented, and the selective one diminished, at least offers us an explanation consistent with all known facts, and seems to be the only active agency to which we can ascribe the approach of the coloured particles to the capillary walls, and the passage through them of the exudation.

When the liquor sanguinis is exuded, it generally coagulates, and constitutes a foreign body in the texture of the parts affected, which it becomes the object of nature either to remove from the system, or so to modify that its presence may be rendered conducive to the wants of the economy. In order to accomplish this, two kinds of changes may take place—1st, The exudation serves as a blastema, in which new vital structures originate and are developed; 2d, It exhibits no power of becoming organised, and the exuded matters, together with the textures involved in them, die. In the former case corpuscles spring up in the exudation, which differ in form, size, constitution, and power of further development, and give rise to those various appearances and changes which in some cases have been denominated the results of inflammation, in others various kinds of deposits. In the latter case, death of the exudation takes place—slowly, constituting ulceration; or rapidly, producing gangrene.

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* Diagnostische und Pathognetische Untersuchungen, &c., 1845. He also found that in man the colourless corpuscles of the blood were few in number during inflammations, and were augmented during successive bleedings, so that he concluded the *fewer* there are of these the higher is the degree of inflammation.

III.—Vital Transformations of the Exudation.

We find that the peculiar constitution of the blood, or the general vital power of the organism, exercises a very powerful influence on the development of the exudation. This has been long recognised by pathologists in certain conditions, denominated respectively diathesis, dyscrasia, or cachexia. I propose at present to direct your attention to some of the facts connected with exudation as it occurs in the body during health, as well as when connected with cancerous and scrofulous constitutions. I shall call the former *simple* exudation, to distinguish it from what may be denominated *cancerous* and *tubercular* exudations.

Simple Exudation.

Simple exudation presents four principal forms—1, As it occurs on serous membranes, when it exhibits a finely fibrous structure, and has a strong tendency to be developed into molecular fibres; 2, As it occurs on mucous membranes, or in areolar tissue, when it is generally converted into pus corpuscles; 3. When it occurs in dense parenchymatous organs, such as the brain, where it assumes a granular form, and is associated with numerous compound granular corpuscles; 4, As it is poured out after wounds or injuries, and occurs on granulating sores. In this last case the superficial portion is transformed into pus corpuscles, while that deeper seated is converted, by means of nuclei and cells, into nucleus and cell fibres, which ultimately form the cicatrix.

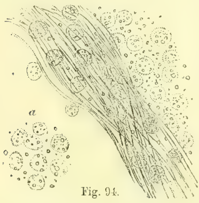

Fig. 94.

1. On examining the minute structure of the exudation on a serous surface when recently formed, and when it presents a gelatinous semi-transparent appearance, it may be seen to be made up of minute filaments mingled with corpuscles (Fig. 94). The filaments are not the result of the development of either a nucleus or a cell, but are formed by the simple precipitation of molecules, which arrange themselves in a linear manner, in the same way as they may be seen to form in the buffy coat of the blood. As the exudation assumes firmness, the filaments become more distinct and consolidated, and vary from $\frac{1}{14,000}$th to $\frac{1}{10,000}$th of an inch in diameter. Bundles, or different layers of them, often cross each other. As the lymph becomes older, they assume more and more the character of those in dense fibrous tissue. The corpuscles, when newly formed, are delicate and transparent, but in

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Fig. 94. Molecular fibres and plastic corpuscles, in simple exudation on a serous surface. *a* The latter, after the addition of acetic acid. 250 *diam.*

a short time become more distinct, and are then seen to be composed of a distinct cell-wall, enclosing from three to eight granules. They vary in size from $\frac{1}{1300}$th to $\frac{1}{1000}$th, and the enclosed granules from $\frac{1}{14,000}$th to $\frac{1}{10,000}$th of an inch in diameter. On the addition of water and acetic acid, the corpuscles undergo no change, although sometimes the latter re-agent causes the cell-wall to contract and thicken; and at others, to be somewhat more transparent. In 1842, I separated these bodies from pus cells, and called them *plastic* corpuscles, from the frequency of their occurrence in plastic lymph. Lebert, in 1845, confirmed my description and called them *pyoid*, from their resemblance to pus.

These corpuscles after a time melt away among the fibres, but several of them remain, and has been shown by Dr. Drummond to constitute permanent nuclei. After a time, blood-vessels grow in the exuded lymph, (see Vascular Growths) the surface of which becomes villous. Into the villi loops of vessels penetrate, and they commence absorbing the contained fluid from the interior of the shut sac. Gradually the fluid diminishes, and when the villous surfaces are at length brought into contact, they unite, and ultimately form the dense chronic adhesions so common between serous membranes.

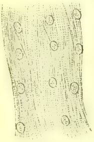


Fig. 95.

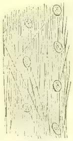


Fig. 96.

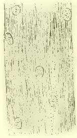


Fig. 97.

Fig. 98.

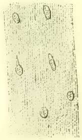


Fig. 99.

2. Exudation poured out on a mucous membrane sometimes presents a fibrous mass, as in cases of croup and diphtheritis, but more generally it passes into an opaque, unctuous, straw-coloured fluid long known under the name of pus. When poured into the meshes of the areolar tissue, and occasionally in the brain, the same transformation occurs, constituting an abscess. On examining the minute structure of pus, it is seen to be composed of numerous corpuscles floating in a clear fluid. These corpuscles are perfectly globular in form, and vary in size from the $\frac{1}{2000}$th to the $\frac{1}{1200}$th of an inch in diameter. Their surface is finely granular. They have a regular well-defined edge, and

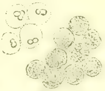


Fig. 100.

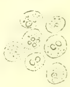


Fig. 101.

Fig. 95. A portion of recent lymph from the pleura.

Fig. 96. Another portion of the same, further developed.

Fig. 97. Portion of firm pleural adhesion.

Fig. 98. Another portion of the same, further developed.

Fig. 99. The last acted on by acetic acid.—(*Drummond.*) 180 *diam.*

Fig. 100. Pus cells. Four cells have been acted on by acetic acid.

Fig. 101. Pus cells containing fatty molecules, after adding acetic acid. 250 *di.*

roll freely in the liquor puris upon each other. On the addition of water, they become much increased in size, their finely granular surface disappears, and they become more transparent. Weak acetic acid partially, and the strong acid completely, dissolves the cell-wall, and brings into view an included body, generally composed of two or three granules close together, and rarely four or five, each with a central shadowed spot. These are usually about the $\frac{1}{6000}$th of an inch in diameter. (Figs. 100, 101, also Figs. 38, 39.)

In some cases the pus corpuscles now described are surrounded by an albuminous layer closely resembling a delicate cell-wall (Fig. 40), which I first described in 1847. It is about the $\frac{1}{1000}$th or $\frac{1}{800}$th of an inch in diameter, and is highly elastic, assuming different shapes, according to the degree and direction of the pressure to which it is subjected. Water and acetic acid cause it at once to dissolve, whilst the included pus corpuscle, exhibits the usual body composed of two or three granules.

In what is called scrofulous pus, the corpuscles, instead of being round and rolling freely on each other, are misshapen and irregular, (Fig. 41) and on the addition of acetic acid, the granular nuclei are ill formed or absent (Figs. 102, 103).

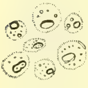


Fig. 102.

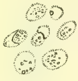


Fig. 103.

Pus cells, if not evacuated externally, ultimately dissolve, their walls disappear, the included nuclei and granules separate, and in their turn are converted into a fluid. This passes into the blood, increases for a time its effete constituents, but is at length excreted by the emunctories. Meanwhile the original abscess, or collection of matter, is said to be *resolved.*

3. In parenchymatous organs, the exudation insinuates itself among the elementary tissues of which they are composed, so that when it coagulates these are imprisoned in a solid plasma, like stones in the mortar of a rough cast wall. The whole then constitutes a firm mass, giving increased density to organs, a circumstance well observed in the lung, where, however, a mucous surface extensively prevails, and where the exudation is commonly transformed into pus. In the brain, spinal cord, and placenta we find it to be deposited in the form of minute molecules and granules, which are frequently seen coating the vessels externally, and filling up the intervascular spaces (Fig. 104). The granules vary in size from the $\frac{1}{12,000}$th to the $\frac{1}{6000}$th

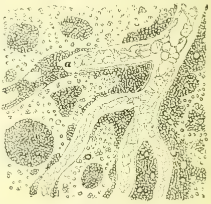


Fig. 104.

Fig. 102. Scrofulous pus cells after the addition of acetic acid.

Fig. 103. The same. In both specimens the nuclei are irregular or absent.

Fig. 104. Granular exudation and granular masses, from cerebral softening. 250 *di.*

of an inch in diameter. They always contain among them round transparent globules, varying in size from the $\frac{1}{5000}$th to $\frac{1}{3000}$th of an inch in diameter. These are the nuclei of round or oval cells which may frequently be observed in various stages of development. When fully formed, the cells vary greatly in size, for the most part measuring from the $\frac{1}{1000}$th to $\frac{1}{750}$th of an inch in diameter. They sometimes contain a few granules only, at others they are so completely filled with them, that they assume a brownish-black appearance. Water and acetic acid cause no change in them, although the latter re-agent on some occasions renders the cell-walls more transparent. They are immediately soluble in æther, and break down into a molecular mass on the addition of potash and ammonia. These are granular cells (Fig. 105). Masses of these granules may be occasionally seen floating about, of irregular shape, without any cell-wall. They are produced either by the solution of the cell-wall in which they were contained, or from the separation, or peeling off, of such masses from the external wall of the vessels. These are granular masses (Fig. 105 *a*). Pressure causes these granules to coalesce, or the oil to be forced through the cell-wall. Occasionally also the cell-wall is ruptured.

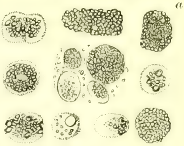


Fig. 105.

The granules, masses, and cells just described are found in the colostrum secreted by the mammary glands; in the exudative softening of parenchymatous organs; on the surface of granulations and pyogenic membranes; in the pus of chronic abscesses; combined with cancerous, tubercular, and all other forms of exudation; in the tubes of the kidney when affected with Bright's disease; and in the contents of encysted tumours. In fact, there is no form of cell-growth, whether healthy or morbid, that may not, under certain conditions, accumulate fatty granules in its interior, become a compound granular corpuscle, and thus be rendered abortive. The granular cells in an exudation, however, are the results of a vital transformation in that exudation, and not of a mere fatty degeneration of the vessels as some have supposed. In some instances they may be seen in all stages of development coating the blood-vessels, as in Fig. 106.

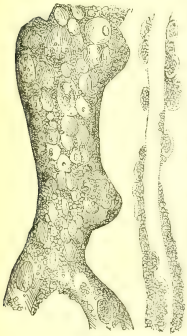


Fig. 106.

Fig. 105. Granular cells and masses from cerebral softening.

Fig. 106. Two vessels coated with exudation from softening of the spinal cord. Granular cells may be seen forming in it. 250 *diam.*

That softening from the formation of granules and granular cells may occasionally disappear, and be absorbed, is rendered probable by the history of several well recorded cases; but the changes thereby produced, especially in nervous textures, has not hitherto been made the subject of special investigation.

4. If a recently formed granulation on the surface of a healing sore be examined, numerous cells will be observed, of various shapes, and in different stages of development. Some are round, others caudate, spindle-shaped, elongated, or splitting into fibres, as originally described by Schwann (Fig. 107). In many cases there may be seen a number of free nuclei, imbedded in a slightly fibrous blastema, elongating at both ends, becoming fusiform, and splitting up the surrounding exudation, as described by Henle. Not unfrequently the nuclei may be seen developing themselves into elastic fibres, in the same exudation containing cells that are passing into white fibres. Indeed, the process of cicatrization in its various stages, and in different tissues, offers the best means of studying the manner in which nucleus and cell fibres are respectively formed. As these fibres are developed in the deeper layers of the exudation, a villous vascular basis is formed, and the superficial pus-corpuscles, after having served to protect the more permanent growths, are thrown off in the form of discharge. When the fibrous structure becomes more consistent and dense, the amount of pus diminishes, and a greater tendency is manifested by the exudation to pass into permanent tissue. At length pus ceases to be developed; the whole remaining exudation is transformed into fibres; a new surface is produced, which, after a time contracting, forms the permanent cicatrix.

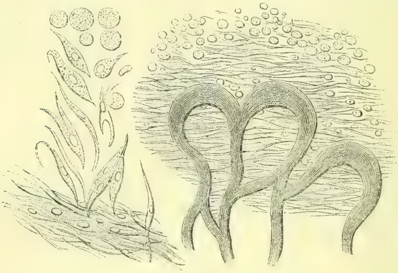


Fig. 107.

Fig. 107. Vertical section of a granulating sore. Externally, pus corpuscles, deeper, fibre cells in various stages of development into fibre. The looped blood-vessels are seen enlarged at their extremities, *magnified* 100 *diameters Linear*. On the left, the cells are magnified 250 *diameters Linear*.

Cancerous Exudation.

Cancerous exudation presents three principal forms which are dependent on the relative amount and arrangement of the cells and fibres formed in it. 1, The structure is very hard, and is principally formed of fibres (*scirrhus*). 2, The structure is soft, containing a copious milky fluid, in which numerous corpuscles swim (*encephaloma*). 3, The structure has a fibrous basis, so arranged as to form areolæ or loculi, containing a gelatinous gum or glue-like matter (*colloid cancer*).

1. *Scirrhus* presents to the naked eye a whitish or slightly yellowish tinge; is dense and hard to the feel, and offers considerable resistance to, and often crunches under, the knife. On making a thin section of the growth, it is seen to be principally composed of filaments, which vary in size, and run in different directions, sometimes forming waved bands, at others an inextricable plexus, among which, however, nucleated cells (cancer cells) may be seen to be infiltrated. Occasionally the fibrous structure forms loculi or cysts, enclosing similar cells.

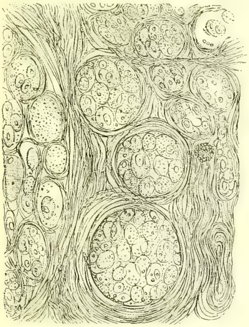


Fig. 108.

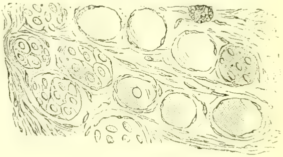


Fig. 109.

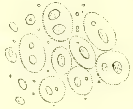


Fig. 111.

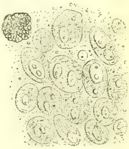


Fig. 110.

The so-called *cancer-cells* may be round, oval, caudate, spindle-shaped, oblong, square, heart-shaped, or of various indescribable forms, from pressure on their sides. In size they may vary from the $\frac{1}{1200}$th to the $\frac{1}{400}$th of an inch in diameter. The cell-wall, when young, is smooth and distended; when old, it is more or less corrugated and flaccid. Each cell contains at least one nucleus, often two, and sometimes they increase in number from three to nine. Most commonly

Fig. 108. Section showing the arrangement of cells and fibres in scirrhus of the mamma.

Fig. 109. The same, after the addition of acetic acid.

Fig. 110. Isolated cancer-cells, from the same growth.

Fig. 111. The same, after the addition of acetic acid. 250 *diam.*

there is only one, which is round or oval, generally the latter, and contains one or two granules or nucleoli. The nucleus also varies in size, and may occupy from one-sixth to four-fifths of the volume of the cell. Between the nucleus and cell-wall there is a colourless fluid, which, at first transparent, becomes afterwards opalescent, from the presence of molecules and granules. On the addition of water, the cell-wall becomes distended by endosmose, and is enlarged. When acetic acid is added, the cell-wall is rendered more transparent, and in young cells is entirely dissolved (Fig. 113), whilst the nucleus, on the other hand, either remains unaffected, or its margin becomes thicker, and its substance more or less contracted.

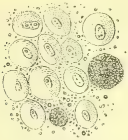


Fig. 112.

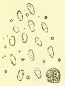


Fig. 113.

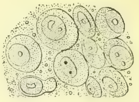
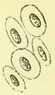


Fig. 114.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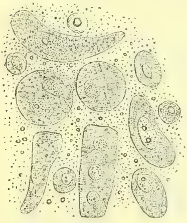
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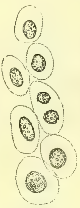
Fig. 117.

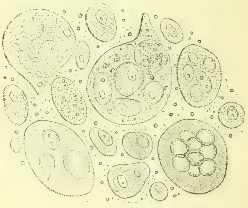
Fig. 118.

2. *Encephaloma* also presents a fibrous texture, which, however, is very loose when compared with that of scirrhus. In the denser parts of the growth, indeed, it closely resembles that form of cancer, but where it is pulpy and broken down, often no traces of fibres, or at most some fragments of them only, are visible to the naked eye.

The whitish cut surface is often more or less mottled, with a greyish, pinkish, reddish, yellowish, or black colour. The two first

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Fig. 112. Young cancer-cells from the lung.

Fig. 113. The same, after the addition of acetic acid.

Fig. 114. Somewhat older cells from the testicle.

Fig. 115. The same, after the addition of acetic acid.

Fig. 116. Still older cancer-cells from a tumour in the duodenum.

Fig. 117. The same, after the addition of acetic acid.

Fig. 118. Highest development of cancer-cells, including secondary cells, from a tumour of the toe. 250 *diam.*

are owing to different degrees of vascularity. The reddish spots are owing to extravasations of blood, of greater or less extent; and these, when very large, constitute what has been called by some surgeons *fungus hæmatodes*. The yellowish colour, when it surrounds bloody extravasations, is owing to imbibition of their colouring matter; but when reticulated over the surface, or collected in masses, it is generally dependent on fatty degeneration of the cancerous tissue, and forms the so-called reticulum *(cancer reticulare of Müller)*. This yellow matter is usually of cheese-like consistence, friable, and often resembles tubercle, for which it has been mistaken. The blackish tinge is owing to black pigment which may be infiltrated among the cancerous elements, and exist within the cells, constituting the malignant melanosis, or melanic cancer, of authors. (See Fatty and Pigmentary Degenerations.)

A small portion of the cream-like fluid, examined with a microscope, always presents a large number of the cancer-cells formerly described, which in some specimens of encephaloma reach a higher degree of development than in other forms of cancerous growth (Figs. 118, 119). These are mingled with a large number of molecules and granules, compound granular cells, blood corpuscles, and more or less of the fibrous element. The fibrous structure is the same as that in scirrhus, but the filaments are often finer, and always more widely separated, while the pulpy matter and cells contained in the interstices are correspondingly increased. The yellow reticulum is sometimes composed of loose granules and compound granular cells, at others of granules alone. Not unfrequently it contains nuclei, disintegrated and altered in shape, with crystals of margarine or of cholestrine. In some instances the encephaloma is more or less impregnated with irregular masses of mineral matter, and occasionally almost entirely converted into a calcareous substance. In this way cancer is liable both to the fatty and calcareous-degenerations. (See Fatty and Mineral Degenerations.)

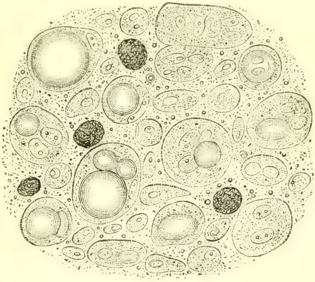


Fig. 119.

Fig. 119. Simple and compound cancer-cells from the duodenum. Several contain fluid from endosmose, which strongly refracts light.

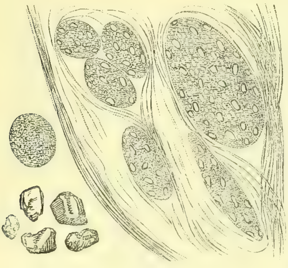
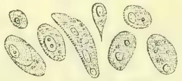


Fig. 120.

3. *Colloid cancer* consists of a fibrous structure so arranged as to form areolæ or loculi, which are filled with a grey or amber-coloured glutinous matter, sometimes transparent, at others opalescent or semi-opaque. This matter is occasionally found quite structureless, or exhibits only a finely molecular appearance (Fig. 120). Under these circumstances the term *colloid tissue* has been applied to it. At other times numerous nucleated cells, presenting all the characters of cancer-cells, in various stages of development, are found in it as a blastema; and we observe that the growth has a tendency to spread. This is colloid cancer, which, when it is formed on a free surface, as on the peritoneum, often presents small grains of a grey colour, resembling coagulated gum-arabic. When collected in masses,

Fig. 122.



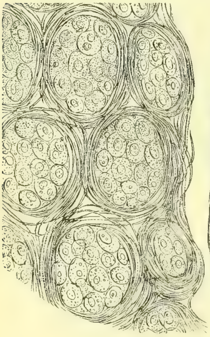


Fig. 121.

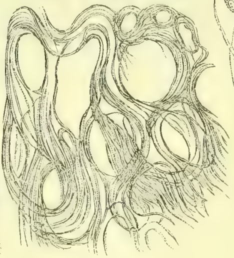


Fig. 124.

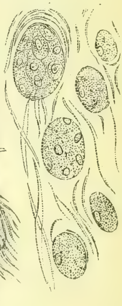


Fig. 123.

Fig. 120. Colloid tissue, with the loculi filled with molecular matter in which cells are commencing to form. On the left of the figure, one of the molecular masses has been squeezed from the fibrous matrix. Below masses of mineral matter.

Fig. 121. Colloid cancer. Appearance of the fibrous areolæ filled with cancer-cells.

Fig. 122. The same after the addition of acetic acid.

Fig. 123. Some of the cells isolated.

Fig. 124. Fibrous stroma deprived of the cells by pressure and washing. 250 *diam.*

these have an irregular nodulated aspect. I have never seen the fibrous structure of colloid contain permanent nuclei, or afford any evidence of being developed from nuclei or cells.

All the three forms of cancer now described are vascular, but in different degrees. Scirrhus is least so, but is still rich in blood-vessels. Encephaloma is always very vascular, and often to such a degree, that it readily bleeds during life (*fungus hæmatodes.*) Colloid cancer is also well supplied with vessels, which ramify among the fibrous tissue. I have already stated that these forms pass into each other, and need only remark here, that this is often so gradual in many specimens, as to render their classification very difficult. This is especially the case with scirrhus and encephaloma.

Tubercular Exudation.

Tubercular exudation has been spoken of as presenting a miliary infiltrated or encysted form; but these distinctions have no reference to structure, but merely to the extent and age of the exudation. It generally presents a yellowish or dirty-white colour, and varies in consistence from a substance resembling tough cheese to that of cream. Sometimes it is soft at one place, and indurated at another. On section, when tough, it presents a smooth or waxy, and when soft, a slightly granular surface. On pressure it is friable, and may break down into a pulpy matter, but never yields a milky juice.

A small portion squeezed between glasses, and examined under the microscope, presents a number of irregular shaped bodies approaching a round, oval, or triangular form, varying in their longest diameters from the $\frac{1}{2000}$th to $\frac{1}{1200}$th of an inch. These bodies contain from one to seven granules, are unaffected by water, but rendered very transparent by acetic acid. They are what have been called tubercle corpuscles. They are always mingled with a multitude of molecules and granules, which are more numerous as the tubercle is more soft. Occasionally, when softened tubercle resembles pus,

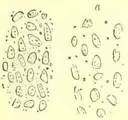


Fig. 125.

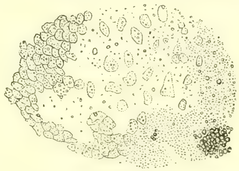


Fig. 126.

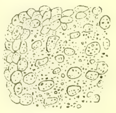


Fig. 127.

Fig. 125. Corpuscles from firm tubercular exudation into the lung. *a*, After the addition of acetic acid.

Fig. 126. Corpuscles, granules, and debris, from soft tubercular exudation into the lung.

Fig. 127. The same, from tubercular infiltration of a mesenteric gland. 250 *diam.*

constituting scrofulous purulent matter, we find the corpuscles more rounded, and approaching the character of pus cells (Fig. 41). They do not always, however, on the addition of acetic acid, exhibit the peculiar granular nuclei of these bodies (Figs. 102, 103.)

The grey granulations described by Bayle may be seen on careful management of the light, after the addition of acetic acid, to contain similar bodies to those described as tubercle corpuscles, closely aggregated together, with their edges indistinct, and containing few granules.

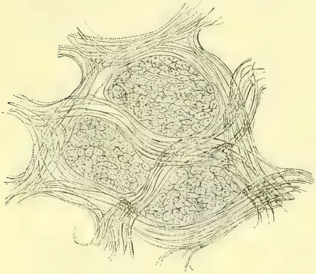


Fig. 128.

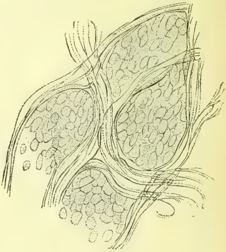


Fig. 129.

Cretaceous and calcareous tubercles, on the other hand, contain very few of these bodies, their substance being principally made up of numerous irregular masses of phosphate of lime, and a greater or less number of crystals of cholestrine. (See Mineral Degeneration.)

Tubercle corpuscles may be associated with pus and granular cells, as well as those peculiar to glandular organs or mucous surfaces in various stages of fatty transformation and disintegration. With all these they have frequently been confounded.

IV.—Pathology of the Three Kinds of Exudation.

We have seen that the liquor sanguinis transudes through the coats of the capillaries, and, coagulating outside the vessels, constitutes an exudation more or less solid. Much of the serum which accompanied it is rapidly absorbed, but what remains constitutes a blastema, which becomes organised in the various ways described, according to the seat and nature of the exuded matter. In simple exudation we find differences according as it is poured out on a serous, mucous, or granulating surface, or into a dense parenchyma. These differences are dependent on the seat of the exudation. But

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Fig. 128. Section of a grey granulation in the lung, showing the pulmonary vesicles filled with tubercle corpuscles. 250 *diam.*

Fig. 129. Section of a firm miliary tubercle of the lung.

in cancerous or tubercular exudations, we observe no such distinctions, although it has been observed that fibrous cancer or scirrhus is most common in fibrous organs, and cell cancer or encephaloma is most common in cellular organs. The more important characters of the three kinds of exudation may be shortly stated as follows :—

We observe in a simple or inflammatory exudation, that it may occur at all epochs in life; that it may attack all tissues, and most commonly those which are very vascular; that it may be poured out in large or small quantities; and that it may occur with greater or less rapidity—hence the terms acute and chronic. We further observe, that the acute exudations are generally attended with symptoms of a peculiar character (inflammatory), and have a great tendency to cell or temporary formations, which rapidly break down, are absorbed and excreted by the emunctories; that the chronic exudations, on the other hand, have a tendency to fibrous or permanent formations, producing adhesions, strictures, indurations, etc.

We observe, in a cancerous exudation, that it occurs for the most part in persons of adult or advanced life; that it may also occur in every tissue, but is by far most common in glandular or fatty organs, such as the liver or female mamma, and is very apt to attack the lymphatic glands *secondarily;* that its progress, although sometimes slow when very fibrous, becomes rapid when corpuscles abound in it; that there is a great tendency to the formation of the most perfect forms of cell life, which have the power of self-development, and thereby of spreading to neighbouring tissues; and lastly, that when, by pressure, ulceration is produced on free surfaces, it bursts through these in exuberant fungoid excrescences. (Fig. 256).

We observe, in a tubercular exudation, that it occurs for the most part in young subjects, between the periods of dentition and of adult age; that it may also occur in all tissues, but is by far most common *primarily* in the lymphatic glands, and afterwards in fibrous or albuminous textures, as the lungs and serous surfaces; that its progress is in general exceedingly slow; that there is no disposition to the formation of perfect cell-formation, but rather to abortive corpuscles, which form slowly, and slowly break down; that there is little tendency to absorption, but great liability to disintegration and ulceration; and finally, that the local changes are almost always preceded by derangement of the primæ viæ, and a group of symptoms known under the name of dyspepsia.

Taking, then, the products of simple exudation (say pus) as a standard, we cannot fail to remark, that whilst the cell development of tubercle is below, that of cancer is above, this standard. Of the three kinds of exudation, tubercle is the lowest, and cancer the highest, in the scale.

Of the ultimate cause producing this difference in the formative power of the exudation we are ignorant, but every kind of reasoning must lead us to the conclusion, that these changes and effects depend, not upon the vascular system, which is the mere apparatus for the production of exudation; not upon the nervous system, which conducts impressions to or from this apparatus; and not on the texture, which is the seat of the exudation, as that varies, whilst the cancerous or tubercular formation is the same—but in the inherent composition or constitution of the exudation itself. On this point most pathologists are agreed, and hence the supposed existence of various kinds of dyscrasiæ, originating in the blood, which it is imagined explain the different results produced. But here pathologists pause—once traced back to the blood, they are content; and they have not sufficiently taken into consideration, that the blood itself is dependent for its constitution on the results of the primary digestion in the alimentary canal on the one hand, and the secondary digestion in the tissues on the other. Yet it must be evident to every physiologist, that if it be the constitution of the blood which determines the constitution of the exudation, the causes which produce this must be sought in those circumstances which operate on the composition of the former fluid.

Now, numerous facts render it probable that while the blood is normal in simple exudation, it contains an excess of nutritive materials in cancerous, and a deficiency of them in tubercular, exudation. These are points, however, which can only be established after examining instances of such exudations in detail. But it must not be forgotten, in the meantime, that as the blood is continually undergoing changes, is receiving and giving off new matters, it can scarcely happen that it remains the same for many hours together. An exudation at one time may be very different from that at another. At one period it may abound in elements which do not exist in it at the next. Hence it often happen that a concurrence of circumstances is necessary to occasion a certain result. A cancer once formed, may remain local until such a concurrence of events arises, comprising, first, the phenomena leading to and producing an exudation, secondly, the occurrence of this exudation in some other tissue or organ sufficiently predisposed for the purpose, and thirdly, a peculiar constitution of the blood. Hence why the histologist is continually finding all kinds of intermediate formations between the three leading kinds of exudation, and why, even when the constitution is thoroughly cancerous or tubercular, simple exudations may be poured into tissues as the result of recent wounds or injuries. But, whilst a recent cancerous or a tubercular exudation may be found to accompany, or alternate with, a simple exudation, the two former are seldom, if ever, met with together—a circumstance which still further points out the wide difference between the constitutional causes producing them.

The final termination of either kind of exudation may be the same, only each has its peculiarities. We have noticed the tendencies of simple exudation to be transformed into pus or fibres, according to its seat. In the former case, the pus cells break down, and are re-absorbed in a disintegrated and fluid condition into the blood; in the latter, permanent fibrous tissue is produced, constituting chronic adhesions or cicatrices. The cells of a cancerous growth may also degenerate or decay, but this rarely takes place throughout the whole structure. But it is not uncommon to find in certain encephalomatous tumours, yellow matter either in masses or reticulated through its substance—(*Cancer Reticulare of Müller*). This is generally owing to fatty degeneration of the cancer cells. (See fatty degeneration.) The fibrous structure of cancer may also increase, and occasionally produce cicatrization. Tubercle possesses no such fibrous stroma; but is infiltrated among the elements of various organs, the vascularity of which it tends to destroy. This, indeed, is the reason why a cancerous tumour increases by growth, which tubercle cannot be said to do; the former is vascular, the latter is not: in the one, cells are formed which have the power of re-development, in the other, no reproductive cells are produced. In cancer, the morbid matter circulating in the blood (whatever that is), is concentrated or attracted to the cancerous part, and should none afterwards be present, the healthy blood is made subservient to the purpose of nourishing a foreign growth. In tubercle, successive fresh exudations only are made, which, by their accumulation, augment the volume or amount of the morbid product.

All three forms of exudations may be rendered abortive by the animal matter being broken down and absorbed, while the mineral matter remains, constituting a cretaceous or calcareous concretion. This is not unfrequently seen as the result of simple exudation; is rare in cancerous, but very common in tubercular, exudation.

During the disintegration of simple, cancerous, and tubercular exudations, the animal matter broken down is again rendered fluid, repasses into the blood, and then constitutes that excess of fibrin detected by chemists. (See p. 107.) The quantity of this, will, of course, vary according to the amount of the exudation and the activity of the disintegrating process. In the blood this effete matter undergoes a series of chemical changes, preparatory to its excretion by the different emunctories, but more especially by the kidneys, in the form of various sediments. The resolution of simple exudation is generally accompanied by the presence of such urinary sediments, which indicate pretty clearly in what way, after it has passed through the phases of development described, it is at length discharged from the body. In the same manner the amount of these sediments frequently points out the extent of absorption going on in cancerous and tubercular exudations.

Another theory has been advanced regarding the various products of exudation as we have described them, viz., that instead of being new formations in an exuded blood plasma, they are only modifications of pre-existing texture. According to this view, pus cells are only altered epithelial ones, cancer cells are an increased development of gland or other cells, and tubercle corpuscles are a degeneration or "necrosis" of these. This theory, though it has many facts for its support, is opposed by others, so that its fallacy is easily demonstrated. For instance, pus cells may occur in tissues where no epithelial cells exist, as among muscles, while cancer and tubercle both are found in the white substance of the brain where there are no cells to develop themselves in the one case, or to degenerate in the other.

V.—Death of the Exudation.

The exudation, instead of passing into the vital transformations we have previously described, may die, and that in two ways—1*st*, Rapidly —constituting what has been called *Mortification* or Moist Gangrene; and, 2*d*, Slowly—causing gradual disintegration and loss of texture, and thereby forming what has been denominated *ulceration*.

Mortification or Moist Gangrene.

Occasionally a very large amount of blood plasma is thrown out; a greater or less number of capillaries are also ruptured, and blood corpuscles are more or less mixed up with the *liquor sanguinis* exuded. The exudation thus formed compresses the part, so as to paralyse the nerves, obstruct the blood-vessels, and prevent the return of any circulation in them. Under these circumstances, instead of forming a blastema for the production of new structures, it undergoes chemical changes, which induce in it decomposition, and the part is said to be mortified, or to be affected with moist gangrene. This change commences first in the blood extravasated, which becomes of a purple colour more or less deep; the corpuscles break down and become disintegrated; their hæmatozine dissolves and colours the serum; and, should the exudation have coagulated, it forms brown, rust-coloured, purple, or blackish masses. An acid matter is now formed, which, acting on the neighbouring tissues, produces fœtid gases, that are abundantly given off from the affected part. Sulphuretted hydrogen is evolved, which causes the blackish sloughs usually observed in such cases, and discolours silver probes and the preparations of lead. After a time, the

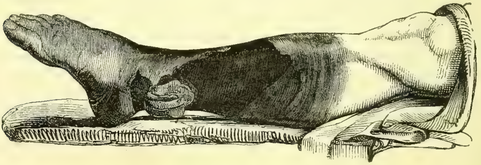

Fig. 130.

Fig. 130. Moist gangrene, following compound fracture—all the injured parts infiltrated with exudation, which has died and mortified.—*Liston.*

elementary tissues surrounding or involved in the exudation become more or less affected. The transverse striæ in the fasciculi of voluntary muscles become first pale, and are then obliterated. Cellular tissue, fat, and other soft substances, lose their connection, and fall into an undefined granular mass. The tendons and fibrous tissue retain their characteristic structure for a long time after the other soft parts have been reduced to a softened pulp. The bones resist the action longest, but at length, commencing externally, they become rough, soft, and are more and more broken down, and reduced to the same pulpy consistence and granular structure as the surrounding parts.

As the tissues thus become broken down and fluid, they are discharged from the system in the form of an ichorous matter, which, examined microscopically, presents numerous granules, imperfect or broken down cells, blood corpuscles, and fragments of filamentous tissue or of the other structures involved. If the morbid action be seated in the subcutaneous tissue, the skin soon becomes affected; and an opening is formed, which rapidly increases, and gives vent to the discharge. In a similar manner, gangrene of internal organs, by destroying the intermediate parts, at length enables the fluid to reach the surface, or to find its way into the excretory passages, such as the bronchi, the intestinal canal, the meatus auditorius, etc. In this manner life may be endangered by the destruction of organs necessary for its continuance; by the exhaustion resulting from the discharge, and sometimes by the absorption of the ichorous matter, which, on entering the circulation, acts as a poison to the economy. On the other hand, a favourable termination may take place, not only by the dead substance breaking down, and being evacuated externally, but by its being separated *en masse* in the form of slough. In which case a process of regeneration and healing may be set up in the exposed living texture, which may produce a cicatrix in the manner formerly spoken of.

It may be asked, whether mortification is only a greater amount of the exudation? or whether, when this result follows, it is dependent on other circumstances, such as a peculiar state of the atmosphere favouring the decomposition of the exudation poured out? In order to answer these questions, we must distinguish between mortification arising from a variety of circumstances, and moist gangrene properly so

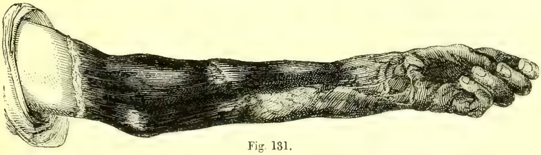

Fig. 131.

Fig. 131. Dry gangrene from debility—being death of the pre-existing tissues, unconnected with exudation.—*Liston.*

called, the which is undoubtedly the rarest of all the terminations of exudation. We frequently see mortification produced by the application of chemical or mechanical agents, which directly destroy the tissues. It also arises from severe and complicated injuries, in which arteries leading to the portions of structure affected have been divided or crushed. In old persons, it follows obstruction in the blood-vessels, or is dependent on circumstances not yet ascertained. In none of these cases is it a result of exudation. But when stasis of the capillaries is produced to a considerable extent, followed by the exudation of a large quantity of blood-plasma, which, instead of passing into organization, undergoes the changes previously described, then moist gangrene, properly so called, is produced. We see this take place after burns, a long exposure to frost, and in certain cases of erysipelas. Here the amount of exudation is considerable, the pressure caused by it extreme, the obstruction to the circulation in the neighbouring parts correspondingly great, and these, as well as the exudation itself, die. In this sense, therefore, it may be said to depend on the rapidity and amount of the exudation. This, however, is not the case in the sense of those who consider the adhesion, suppuration, and gangrene as different stages of one process. Suppuration, as we now know, has no connection with adhesion; it is opposed to it; nor is it in any way related to mortification, which must be considered as a primary alteration of the exudation. The vitality is lost, and instead of passing into organization, it at once becomes subject to the chemical laws of dead matter, and undergoes putrefaction.

Now, in order that organic substances may enter rapidly into putrefaction, it is necessary that they find sufficient oxygen and water for all their carbon to be transformed into carbonic acid, all their hydrogen into water, and all their azote into ammonia. When these conditions are not completely fulfilled, transition or intermediate substances are formed. When there is not sufficient oxygen, for instance, an excess of carbon is produced in the debris, and hence the black colour observed in mortified tissues. There is also often developed a species of contagion, which causes parts undergoing decomposition to excite it in neighbouring ones (*eremacusis* of Liebig). This does not take place in dry gangrene. Thus a gangrenous stomatitis (*Crancum-oris*) destroys, in a short time, a large portion of the soft parts of the lips and face; *Noma* destroys the genitals of young female children. This appears to depend upon the quantity of destructive fluid or mixture generated in the process. A dry gangrenous foot, on the other hand, often requires several weeks before it has produced sufficient decomposition to be detached, and reached all the tissues to the bone.

But there are sometimes external causes which seem to produce mortification, independent of the amount of exudation, or the rapidity with which it is thrown out. During the summer of 1836, I watched with great care the progress of a sloughing gangrene, prevalent, not only in the Infirmary of Edinburgh, but throughout the city generally. All kinds of sores and wounds were affected by it, even those of a specific nature, such as chancres, etc. Neither youth nor age was exempted from it. It affected not only those who were debilitated from disease by intemperance or by diet, but those also in the most robust health. Thus a servant girl, aged 16, who had never suffered from illness, and was of a robust constitution, fell down upon some glass bottles, and slightly cut her left thumb. A week after, she entered the Infirmary with an ulcer the size of a shilling, filled with a brownish-black slough, discharging a fœtid and sanguineous fluid. In this, as well as other cases which occurred, it became impossible to attribute the gangrene to the violence of the injury, the amount of exudation, a state of cachexia, or indeed to any circumstances connected with the individual. It could not arise from contagion, as it originated simultaneously in different parts of the city in individuals who had no communication with each other, was not confined to the Infirmary, and the system of dressing wounds there precludes the possibility of this explanation. We are, therefore, compelled to ascribe the cause to something without.

Most writers have noticed the connection between a certain state of the atmosphere and the prevalence of hospital gangrene and of dysentery, as well as its more frequent occurrence in summer and autumn—that is, at a period of the year when increased temperature favours the decomposition of animal matter. The good effects which result from change of air, when every kind of treatment fails, still further point out its origin from changes occurring in the atmosphere. These probably depend upon some electrical state not yet explained, which powerfully influences the chemical combinations of the diseased part, and prevents cell growth. At least such is what we may reasonably suppose, from all the facts with which we are acquainted on this head. It is similar to blight among vegetables, the potato disease, and so on.

Ulceration.

The process of ulceration is somewhat similar to that of mortification, but is more chronic, and the exudation, instead of undergoing decomposition, only exhibits an indisposition to pass into cell formation. In this case the exudation is poured out slowly, it coagulates and presses upon the surrounding parts, more or less obstructing the flow of blood to them, and acts as a foreign body. By means of the continued pressure, the circulation is obstructed and death of the portion affected results. Sometimes this is imprisoned in fresh exudation, as ulceration extends, and the whole at length becomes disintegrated. All this time the exudation exhibits little of that tendency so conspicuous in healthy persons to undergo changes in itself, and when examined microscopically is found to consist principally of very minute granules.

These are occasionally mixed with irregularly formed cells, usually more or less angular, containing one or more granules. The cells are more numerous in proportion to the stage of the ulceration, and the healthy powers of the constitution. These different granules and imperfect cells, with the structures they involve, at length become broken down, and separated from each other, constituting a semi-fluid mass, which has a tendency to point where it can most readily be discharged, that is, towards the surface of the skin or mucous membranes. Here, on account of the less degree of resistance offered, the continued pressure and disintegration of tissue first causes an aperture to be formed. Another portion of solid exudation is now broken down, with the tissues involved in it, and in this way the opening is enlarged. If the morbid process continue, a fresh exudation is slowly poured out below the already coagulated blood-plasma, which supplies the loss thrown off in the form of discharge, and thus chronic ulcers may be continued indefinitely. The whole of this process may be well observed in scrofulous and syphilitic ulcers, or in the callous sores of the leg in weavers and others of a cachectic constitution. Indeed the general powers of the constitution are almost always in such cases enfeebled, and hence the indisposition of the exudation to be transformed into cells.

Ulcers produced by direct pressure are occasioned in a similar manner; only in such cases the pressure is not derived in the first instance from the solid exudation poured out. Thus, in stumps not sufficiently covered by soft parts, in places long pressed upon by lying, or by the growth of tumours, the vitality of the part is slowly destroyed. At the same time an exudation is poured out from the neighbouring vessels, which becomes broken up, and assists in disintegrating the textures whose vitality is destroyed. The finely molecular particles are thus absorbed, whilst the grosser portions are thrown off in the form of discharge.

All ulcerated surfaces are covered with a fluid, which varies in character according to the nature of the sore. Healthy granulations are covered with laudable purulent matter, and the corpuscles present their normal character. In chronic scrofulous and syphilitic sores the corpuscles are generally of an irregular form, constituting what has been denominated unhealthy purulent matter. Not unfrequently the ulcer is covered with a discharge, either of a thin dirty yellowish tint, or is more or less sanguinolent and fœtid. In the latter case the discharge has received the name of sanies, and is similar in character and constitution to that observed in the fluid accompanying moist gangrene—that is to say, there are traces of imperfect cell formation, mixed with numerous molecules, and the shreds or debris of the structures involved.

Ulceration has by most writers since the time of Hunter been regarded as the result of a peculiar operation, which he denominated ulcerative absorption. No doubt the process, such as we have described it, is peculiarly favourable to the production of a fluid containing molecules so minute that they may readily permeate the neighbouring vessels by endosmosis. But it must not be overlooked that much of the loss of substance observed in ulceration, especially of the more consistent and tough structures, after having been more or less broken up, are thrown off from the surface in the form of discharge. This is proved by direct observation. In either case all such parts first lose their vitality, from the pressure to which they are subjected, and then being broken down, the fluid and finer parts may be absorbed, whilst the coarser are thrown off from the surface.

In bones the corresponding processes to mortification and ulceration in soft parts, are generally denominated *Necrosis* and *Caries*.

VI.—General Treatment of Exudation.

The foregoing facts and considerations must lead us to the conclusion, that practically the medical man may be called upon—1st, To prevent or diminish the extent of an exudation ; 2d, When it has coagulated, to further its removal from the economy ; or, 3d, If this cannot be accomplished, to render its products as little injurious to the system as possible. In each case, we can only proceed correctly by knowing the manner in which nature operates, and assisting those curative changes which she invariably attempts. We have seen that exudation follows certain preliminary alterations in the capillary vessels, and is immediately dependent on relaxation or paralysis of their coats, and transudation through them of the liquor sanguinis. Once formed, it passes through certain changes or developments, dependent on the texture in which it occurs, its amount, the rapidity with which it is formed, and its inherent constitution. Lastly, that the exudation, by means of these changes, is rendered soft, more or less disintegrated, and is absorbed into the blood to be excreted from the economy. A correct treatment, therefore, will be influenced by the stage and nature of the exudation.

1. To prevent or diminish the extent of an exudation, we must adopt measures to overcome the dilatation of the capillaries, their distension with blood, and the attractive power (whatever that is) which draws the liquor sanguinis into the surrounding textures. This is accomplished—1st, By local applications of cold and astringents, which stimulate the capillaries to contraction ; 2d, By soothing topical applications, such as warm fomentations, opiates, etc., which relieve the irritation of the nerves in the part. Blood-letting, local or general, has long been supposed capable of meeting this indication, but theoretically it can no longer be defended, and practically it has of late years been abandoned.

2. When the exudation has coagulated, it constitutes a foreign body, which can only be removed by its becoming organised, or by its dying. In the one case it acts as a blastema, in which structures are developed

that ultimately break it down, and render it capable of being absorbed (resolution), or converted into a tissue that becomes permanent. In the other case, it disintegrates slowly, constituting ulceration—or putrefies, forming moist gangrene, when it is separated from the economy in discharge or as a slough. It is by regulating the formative power of the exudation that we check or favour resolution; and we can only do this by employing those means which lessen or advance growth in all living organisms. Thus locally, cold, dryness, and pressure check; while heat, moisture, and room for expansion favour growth. And as regards the general system, the increase or diminution of food, nutrients and stimuli act for or against this object.

With a view of diminishing the general excitement that prevails, tartar emetic has been recommended, and to assist the absorption of the exuded matter, calomel has been a favourite remedy; but the manner in which these act has been disputed, and whether it be as a solvent of the effete matters in the blood, or by operating on the excretions, is yet undetermined. The former probably acts in both these ways—the use of the latter, as an antiphlogistic, has of late years been almost abandoned. The action of counter-irritants, although undoubtedly useful in removing pain and in causing absorption of chronic exudations, is little understood, and belongs to the most mysterious department of therapeutics.

3. In order to favour the excretion of the effete matters in the blood—purgatives, diaphoretics, and diuretics, alone or combined, will be found very useful. The influence of these remedies, indeed, is not confined merely to removing matters which have been absorbed as the result of the secondary digestion; but, by their depurating qualities, they favour indirectly the rapid absorption of the exudation.

4. In cancerous exudations we must endeavour to restrain the advance of growth, by local cold, dryness, and pressure; attempt its eradication by excision, if this can be appropriately practised; and diminish the tendency to accumulation of nutritive materials in the system, by keeping the excretory functions in full activity.

5. In tubercular exudation, the cell development of which is imperfect, and leads to ulceration and wasting, we have to combat the preliminary phenomena of exudation locally, whilst we improve the nutritive powers of the economy generally. To meet the first indication, counter-irritation and an equable climate are useful; whilst for the second, we must overcome the dyspepsia so hostile to a correct primary digestion, and in additton to exercise and free air, supply the system with easily assimilable animal oils, without which nutrition cannot proceed.

The general indications for treatment now alluded to, of course admit of infinite variations and modifications in individual cases. In the meantime, what I have to tell you with respect to these, will, I think, be more readily comprehended from the preceding considerations.

MORBID GROWTHS OF TEXTURE—THEIR GENERAL PATHOLOGY AND TREATMENT.

The exclusive study of morbid growths sometimes as they affect internal and at others external parts, has led to limited views of the subject. The surgical tendency to speak of them as tumours, and to regard them in reference to the great practical question of excision, has interfered with the true pathological doctrine, namely, that, however or wherever produced, they are essentially the same. No doubt they are very common in external parts, simply because all growth proceeds best on surfaces where there is room for expansion, but this accidental circumstance should not induce us to suppose that they are peculiarly surgical. In truth, their study belongs to pathology—that science which constitutes the basis of all branches of the medical art.

When certain tissues or organs have increased in size disproportioned to the rest of the body, the line which separates health from disease is not always to be determined. Exercise, within certain limits, may cause the size of particular parts to be relatively increased, as in the legs of the dancer, and arms of the blacksmith. In these cases, however, such enlargement is consistent with health. So when the uterus enlarges and its walls thicken during pregnancy, we recognise that the departure from the normal type is absolutely necessary for the purpose it is required to carry out, which accomplished, it returns to its natural condition. In like manner, other hollow viscera enlarge when they have an obstruction to overcome. Thus the urinary bladder becomes greatly thickened, in consequence of a stricture in the urethra, and the left ventricle of the heart becomes hypertrophied from disease of the aortic valves. But in these last cases the increased growth, though a wise adaptation of nature, and even necessary for the continuance of life, must now be regarded as evidence of permanent disease. Again, a blow on the breast, on the skin, or over a bone, may cause the injured parts slowly to enlarge, inducing swellings, which may produce inconvenience from their size, or from their pressure on neighbouring nerves. In this manner no tissue or organ of the body is exempt from more or less increase of its extent and magnitude, and there are none, consequently, which may not occasionally be considered as morbid or pathological.

Increased growth of tissues may assume various forms. The organ or structure may gradually become enlarged in whole or in part, still maintaining more or less of its original texture, shape, and function, constituting *hypertrophy*. Membranes may become preternaturally thickened, causing more or less *induration*, whereby the movements of parts may be affected, or the calibre of tubes and ducts may be diminished, producing *stricture.* The results of the healing process may give rise to new tissues exactly resembling those previously existing in other parts of the body, as in *cicatrices*, *callus*, etc.; or such growths may assume the form of *tumour.* Lastly, we must not overlook the fact that certain transformations in the exudation formerly noticed, lead to increase of texture, and produce morbid growths altogether foreign to the healthy frame.

A cultivation of histology excited the hope that by studying the ultimate structure and mode of development of morbid growths, distinctive elements, and thereby a new foundation for their classification, would be discovered. But extensive researches long ago convinced me that this hope was vain, and in a special work, published in 1849,* I pointed out what were the ultimate elements of all morbid growth, and that no one of these was characteristic. In fact the structural elements may be reduced to six, viz.—1st, molecules and granules; 2d, nuclei; 3d, cells; 4th, fibres; 5th, tubes (especially vascular ones); and 6th, crystals or irregular masses of mineral matter. Now no combination of these elements will serve to characterize morbid growths, such as fibro-molecular, fibro-nucleated, fibro-cellular, fibro-vascular, etc., for the simple reason that tumours very unlike in their external characters and natures may be composed of the same elements. For instance, cystic, glandular, cartilaginous, and cancerous growths are all fibro-cellular. It is not then from the existence of one or more elementary structures, but from a careful investigation of their *mode of arrangement*, conjoined with a careful study of *all* the clinical facts of the individual case, that the microscope is destined to be of infinite importance in pathology and diagnosis. Neither will chemical composition furnish us with trustworthy means of distinguishing morbid growths, as many of them contain albuminous, fatty, pigmentary, and mineral principles conjoined, although in variable proportions.

The best classification, therefore, is one founded on our knowledge of the compound textures of the growths themselves, assisted as far as varieties are concerned by their similitude to well-known objects or accidental circumstances, which have long been received in pathology as standards of comparison. Thus the following arrangement appears to me capable of embracing all the known primary classes of morbid growth:—

I. Fibrous growths	Fibroma† or Inoma.
II. Fatty growths	Lipoma.
III. Vascular growths	Angionoma.
IV. Cystic growths	Cystoma.
V. Glandular growths	Adenoma.

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* On Cancerous and Cancroid Growths. Edinburgh, 1849.

† The word Fibroma, though composed of Latin and Greek words, and therefore barbarous, is here given in conseqence of its having been already employed in medicine. Those, however, who may object to it on this ground, can employ the more correct, though novel term of Inoma, from *ἴς-ἰνός*, a fibre.

VI.	Epithelial growths	Epithelioma.
VII.	Cartilaginous growths	Enchondroma.
VIII.	Osseous growths	Osteoma.
IX.	Cancerous growths	Carcinoma.

All these primary divisions are susceptible of being subdivided according to the presence of particular substances, or to fancied resemblances which have received names. Thus the varieties of the above kinds of growth have long been determined by their substance presenting greater or less similitude to well-known objects, such as water, lard, flesh, brain, &c., &c., as follows :—

1.	Like water	Hygroma.
2.	,, black pigment	Melanoma.
3.	,, green pigment	Chloroma.
4.	,, blood	Hæmatoma.
5.	,, glue	Colloma.
6.	,, lard	Steatoma.
7.	,, gruel	Atheroma.
8.	,, honey	Meliceroma.
9.	,, cholesterine	Cholesteatoma.
10.	,, flesh	Sarcoma.
11.	,, nerve	Neuroma.
12.	,, brain	Encephaloma.
13.	,, marrow	Myeloma.
14.	,, marble	Scirrhoma, etc.

It is easy to understand how varieties may in this way be multiplied, and how new names may be scientifically given to rare forms of tumour, for instance *Syphonoma*, or tubular growth, described by Henle;* *Cylindroma*, by Billroth;† *Heteradenoma* by Robin,‡ etc., etc.

Further varieties have been made to express one or more combinations of these elements, and hence the terms *Fibro-cystic*, *Fibro-cartilaginous*, *Fibro-Sarcoma*, *Osteo-Sarcoma*, and so on. Indeed this kind of nomenclature admits of further extension, and such terms as *Fibro-epithelial*, *Angio-cystic*, *Cystic-adenoma*, *Osteo-fibrous*, and so on, might be employed with advantage. When, also, growths have a certain resemblance to, or largely partake of the structures and substances referred to, while their real nature is not absolutely or altogether the same, the words *Fibroid*, *Cystoid*, *Adenoid*, *Chondroid*, *Osteoid*, *Colloid*, *Hæmatoid*, *Fungoid*, *Encephaloid*, *Myeloid*, *Cancroid*, etc., have been employed.

All these words and modes of expression, as they are founded on anatomical facts, may, if carefully applied, be useful in designating the structure and nature of morbid growths. But other distinctions founded on presumed vital properties, are objectionable. What ideas, for instance, can be attached to the terms innocent and malignant? A fibrous growth has been generally classed among innocent ones, yet the terms recurrent and malignant have also been applied to it. In fact we shall afterwards see that almost every kind of growth may be innocent in some cases, and malignant in others. The distinctions, therefore, sought to be established from such theoretical considerations are not only erroneous, but have proved—as we shall subsequently show—most injurious in practice. I have known innocent growths never operated on by the surgeon, and allowed to kill, in consequence of his believing them to be malignant, and really malignant ones not touched at that early period when their removal was likely to be beneficial, in the hope that they would go away of themselves. This point will be more especially dwelt upon, after giving, as it is now proposed to do, a short sketch of the nine distinct kinds of morbid growths.

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* Zeit. für Ration. Med. 3 Bd. 1 Heft.

† Ueber die Entwicklung der Blutgefässe, Berlin, 1856.

‡ Traité d'Anat. Pathologique, par Lebert, p. 339, et seq.

Fibrous Growths.—Fibroma or Inoma.

The pathological formation of fibrous growths is the most common and universal which occurs in the body. It is essentially of two kinds—1*st*, a simple increase by division or enlargement of pre-existing fibrous tissue; 2*d*, a new formation of fibres in an exudation.

I. As examples of the first kind of increased fibrous growth, we may refer to what takes place in voluntary and involuntary muscle, constituting simple hypertrophy. In voluntary muscle, the fasciculi and fibrillæ increase in breadth, and there is a tendency to fissiparous division, whereby they become more numerous. There may be also observed fasciculi varying greatly in size, but without cells such as are visible in embryonic muscular formation. The same thing occurs in hypertrophy of non-voluntary muscle, where, in addition to great increase of bulk in individual cells, other smaller ones in various stages of development may also be detected. In the uterus during pregnancy this is easily observable, but in the thickening

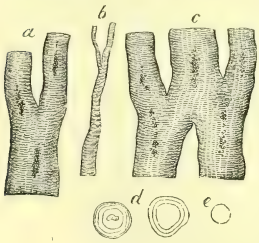

Fig. 132.

Fig. 132. Structures in hypertrophied heart. *a*, A muscular fasciculus dividing dichotomously; *b*, a slender fasciculus dividing; *c*, anastomosing fasciculi; *d*, concentric; *e*, smooth colloid (amyloid?) bodies.—(*Wedl.*) 250 *diam.*

of organic muscular fibre of the stomach and other hollow viscera, the large elongated fusiform cells are not discoverable.

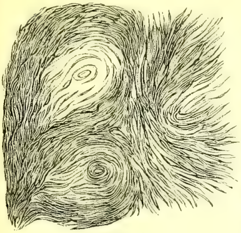

Fig. 133.

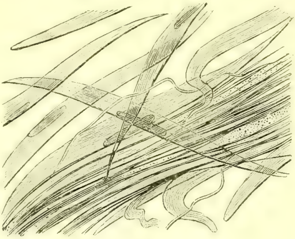

Fig. 134.

II. With regard to the second kind of increased fibrous growth, it may be said to present various forms.

We have previously seen that the coagulation of liquor sanguinis often occurs in the form of filaments (Fig. 94), which become more and more dense. These are *molecular fibres.* Occasionally when the exudation coagulates, it presents a tendency to fibrillate or split up, owing apparently to the formation of nuclei, which become more or less elongated. These are *nuclear fibres.* At other times cells are formed, which elongate, become fusiform, split up, and so produce fibres in the manner described by Schwann in healthy tissues. These are *cell fibres.* In these three ways, there may be produced all kinds and forms of fibrous element, from the finest and most delicate areolar tissue, to one resembling in consistence ligament or fibro-cartilage.

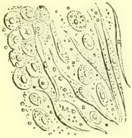

Fig. 135.

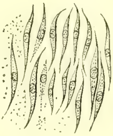

Fig. 136.

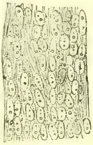

Fig. 137.

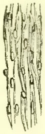

Fig. 138.

Fig. 133. Fibrous structure of the uterus.

Fig. 134. The same, hypertrophied from great increase in size of its fusiform cells.

Fig. 135. Cell fibres and fibre-cells from a fibro-cellular growth in the coats of the stomach.

Fig. 136. Fusiform cells from a sarcomatous growth in the kidney. (See also Fig. 182).

Fig. 137. Fibro-nucleated structure, from a so-called medullary sarcoma of the humerus.

Fig. 138. Fibrous stroma of a tumour acted on by acetic acid. 250 *diam.*

Hence as far as structure is concerned we may have *fibro-molecular*, *fibro-nucleated*, and *fibro-cellular* fibrous growths.

1. One of the most common forms of pathological fibrous tissue is that of *cicatrix*, which is generally produced in the same manner in every tissue and organ. The exudation in such cases is partly transformed into filaments, and partly into pus. The former are in connection with the deep-seated tissues and capillaries, and are covered and protected by the latter. On examining a fungous granulation on the surface of a wound, it may be seen to contain round, oval, caudate, and fusiform cells, in all stages of their development towards fibres. As these increase in amount and become approximated, the formation of pus gradually ceases. At length the new growth reaches the surface of the healthy tissue, contracts, causing more or less puckering of the surrounding structures, and becomes dense like ligament. (See Fig. 107).

2. Another form of pathological fibrous growth occurs after the subcutaneous section of tendons, and in the coats of some hollow viscera. In this case the exudation thrown out fibrillates, oval or fusiform nuclei are formed, which are scattered irregularly through the mass, and the whole often assumes a remarkable degree of toughness. We have seen the coats of the stomach above an inch thick from this cause, entirely independent of cancerous formation. (Fig. 139).

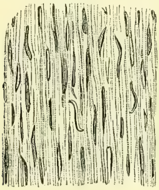
Fig. 139.

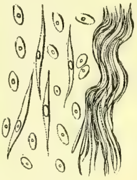
Fig. 140.

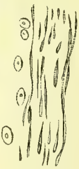
Fig. 141.

3. A third form of pathological fibrous growth is the result of chronic exudation on serous membranes. The white patches so frequently seen, more especially on the pericardium, pleura, and peritoneum, are owing to this cause. (Fig. 140). Occasionally such membranes are connected by bands of firm fibrous tissue, or closely united and hypertrophied into a dense, white ligamentous substance, upwards of half an inch thick, as may frequently be seen in the pleuræ over chronic tubercular lungs.

4. A fourth form of pathological fibrous growth is seen in an increase of the areolar tissue of the skin, or other organs, also owing

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Fig. 139. Fibres, from induration of the stomach, with embedded nuclei.

Fig. 140. Fibrous tissue, with free nuclei and fusiform cells, from a white patch on the peritoneum.

Fig. 141. The same, after the addition of acetic acid. 250 *diam.*

to exudation. Thus we have seen peculiar thickening and indurations of the skin, owing to this cause in the adult. It is very common in the hide-bound skin of certain fœtuses. Atrophy of parts may thus arise; for instance, muscle may be converted into a ligamentous substance. So called cirrhosis of the liver, lung, and kidney, are owing to a similar cause.

5. A fifth form of pathological fibrous growth is that of tumour. Under this head must be classed a number of growths, hitherto denominated sarcoma and neuroma, as well as those usually called fibrous. They all consist of a fibrous structure, in different stages of its development, the softer and more vascular forms being such, even when their substance has not yet completely passed into perfect fibres. For this reason they have been made to constitute a distinct group by Lebert, under the name of fibro-plastic tumours, and may be fibro-nuclear, or fibro-cellular in structure. Such growths, however, may always be seen passing into true fibrous tissue. In some, whilst one part of a tumour may be called sarcomatous, or fleshy, another is truly fibrous. The difference is only one of development, and cannot therefore constitute a good ground of distinction. Other kinds of fibrous tumours resemble tough ligament and fibro-cartilage, presenting all kinds of intermediate degrees of conversion between the areolar and elastic tissues. Fibrous tumours, therefore, may be divided into,—1st, sarcomatous; 2d, dermoid; and 3d, neuromatous fibrous tumours.

Sarcomatous or soft fibrous Tumours.—These tumours are either spherical, or more or less lobulated (pancreatic sarcoma of Abernethy). The first are of the consistence of muscular tissue, or very soft cartilage, and are generally surrounded by a distinct cyst. On section, they present a smooth or finely granular surface. Their colour differs from a yellowish white, to a rose-pink or deep red, dependent on their amount of vascularity. Occasionally a section presents different colours, the external portion being more vascular than the internal, or it is more or less mottled, the red tint alternating with the yellow. At other times the section presents several ecchymotic spots, varying in size, caused by extravasation of blood from the capillaries. Owing to the vascularity of these tumours, there is a disposition to exudation, and breaking down of their substance, with formation of a purulent fluid.

For the most part, they increase in size slowly, only causing inconvenience from their bulk, or by pressing on neighbouring nerves and tissues. Owing to this pressure, they may induce absorption or ulceration of such parts.

Not unfrequently these tumours are more soft and lobulated, and have frequently been mistaken for encephaloma. The lobules vary greatly in size, and present externally a papillary, or cauliflower character, frequently resembling the pancreas, and hence the name given to them by Abernethy. Occasionally the lobules are surrounded by a layer of areolar tissue, more or less dense. They are for the most part, of a greyish, yellowish, or rosy colour, their tint varying with their amount of vascularity.

These tumours are found in many places richly furnished with cellular and fibrous tissue, as below the skin. They are not unfrequent in the mamma, where their separation from scirrhus constitutes one of the nicest points of surgical diagnosis. They may occur in bone, and have received the name of *osteo-sarcoma*, although many tumours that have received this name have been shewn to be cancerous. They constitute small mushroom-like growths on the conjunctiva (*Lebert*), and may destroy the eye from the pressure caused by their enlargement.

The minute structure of these sarcomatous tumours is essentially fibrous, but many of the fibres are seen to be made up of congeries of fusiform cells closely applied together. (Figs. 144, 182). These cells are

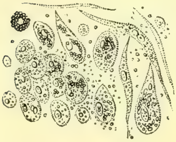


Fig. 142.

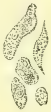


Fig. 143.

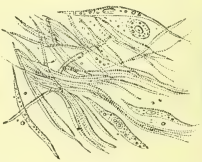


Fig. 144.

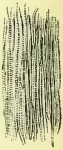
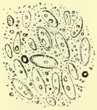
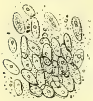


Fig. 145.

Fig. 146.

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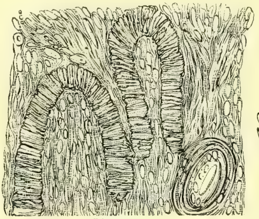
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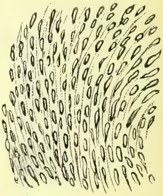


Fig. 149.

Fig. 142. Cells in the soft part of a fibrous tumour removed from the neck by Mr. Syme.

Fig. 143. The same, after the addition of acetic acid.

Fig. 144. Fibres in various stages of development from a harder nodule of the same tumour.

Fig. 145. Perfect fibrous tissue from another nodule of considerable density.

Fig. 146. Corpuscles scraped from the surface of a fibro-nucleated growth of the thigh, excised by Mr. Miller.

Fig. 147. The same, after the addition of acetic acid.

Fig. 148. Appearance of a thin section of the tumour.

Fig. 149. Another section treated with acetic acid. 250 *diam.*

of a spindle shape, varying in length and breadth, for the most part distinctly nucleated. Many of them may be seen branched at their extremities, and passing into fibres, according to the mode of development of fibrous tissue described by Schwann. In some, the nucleus will be found to have disappeared. Other of the cells will be found round or oval, or only slightly elongated. All these stages of a fibro-cellular growth may be observed in the same tumour. In the softer parts, isolated cells and nuclei abound (Fig. 143), whereas in the harder and denser parts, the development into fibrous tissue will be found perfect. (Fig. 145).

At other times associated with the fibres we find a multitude of oval nuclei, without cells of any kind. These I described in 1849 as fibro-nucleated growths. They may be hard or soft, and present the structure represented Figs. 146 to 149, and Figs. 137, 272.

Some tumours of this kind may be so soft as to be pulpy in their consistence, and contain between the meshes of their fibro-cellular structure a certain amount of serous liquid. These are *soft polypi*, For the most part, they constitute prominences on the mucous membrane, to which they are attached by a neck, which may be broad or narrow. (Fig. 150). Externally, they are covered with mucous membrane, more or less hypertrophied and thickened. (Fig. 153).

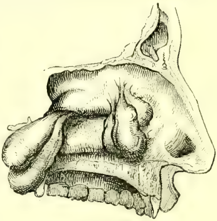


Fig. 150.

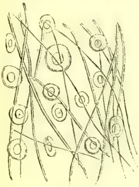
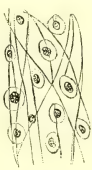


Fig. 151.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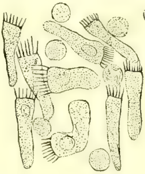
Fig. 153.

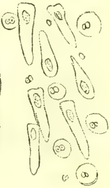
Fig. 154.

Dermoid or hard fibrous tumours. These tumours are generally of a white colour, more or less tough and elastic, resembling the well-known structure of the dermis. This, indeed, is not so apparent in examining the comparatively thin human dermis; but on looking at that of some

Fig. 150. Soft polypi growing from the Schneiderian mucous membrane.—(*Liston.*)—*Half natural size.*

Fig. 151. Fibre cells and fibres from the pulpy interior of a polypus removed by Mr. Syme.

Fig. 152. The same, after the addition of acetic acid.

Fig. 153. Ciliated epithelial and pus cells from the exterior of the tumour.

Fig. 154. The same, after the addition of acetic acid. 250 *diam.*

of the larger animals, and more especially that of the whale, the analogy in structure at once becomes evident. These tumours are of a rounded or oval form, frequently embedded in a cyst, composed of the indurated structures in which they lie. They are of considerable density, varying from that of tendon to that of ligament or fibro-cartilage, and on section present numerous white glistening fibres, intimately interwoven together, or arranged in bundles constituting circles, or loops intercrossing with each other. Occasionally they have a calcareous centre or nucleus. Their colour is generally white, but occasionally they present a yellowish tinge. They are for the most part not very vascular, although there is great difference in this respect, some approaching the pinkish colour of sarcomatous growths, and others being of dead white and of extreme density, containing scarcely any vessels. They vary greatly in size, from that of a pin's head to a volume measuring several feet in circumference.

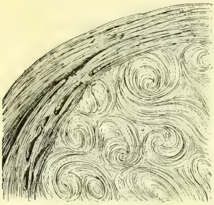
Fig. 155.

These tumours may be situated in various tissues and organs, as in the subcutaneous and submucous cellular tissue, in the mamma, and uterus, in which organ they are most common. When developed in the latter position, they often push the mucous membrane before them. In this way they grow outwards, and frequently form what are called *hard polypi.* At other times they grow towards the serous or internal cavity, pushing the membrane before them in a similar manner, so that it ultimately constitutes a neck or pedicle, by which they are attached. Such pedunculated fibrous tumours are sometimes found in the peritoneum, growing from the uterus. Occasionally the pedicle breaks across, and the tumour becomes free in the serous cavity. To the same cause are owing the small fibrous, oval or round bodies, called loose cartilages, found in the joints, more especially that of the knee, some of which are truly osseo-cartilaginous. Others are found in the veins, and denominated *phlebolites.*

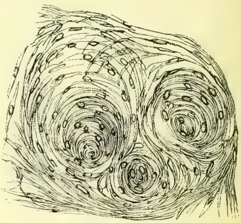
Fig. 156.

The minute structure of these dermoid tumours is found to consist of fusiform cells more or less aggregated together. In the softer portions of the growth they can be easily separated by needles, but in

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Fig. 155. Section of a dermoid fibrous tumour, embedded in the uterine walls. One-fourth of the entire growth is represented. *Natural size.*

Fig. 156. Section of a dermoid fibrous tissue from the uterus, after the addition of acetic acid, showing the concentric direction of the fibres. 250 *diam.*

the indurated portions they are so dense that this is impossible. Sometimes the filaments are more or less waved, as in ordinary fibrous tissue; at others, they are curled and brittle, as in elastic tissue. On making a thin section, they may often be seen to form a concentric fibrous structure, and on the addition of acetic acid, the nuclei, scattered throughout the tissue, are made very apparent. (Fig. 156.) Not unfrequently these latter are collected together in masses (Fig. 157), and sometimes they are isolated, as in the sarcomatous tumours; but then the proportion of them to the fibrous element is generally small. The bony nuclei of such tumours are composed of amorphous mineral matter, not of true bone, although Lebert says that on two occasions he has seen true bone produced. Wedl also has figured true bone in the interior of these growths. (See Fig. 253.)

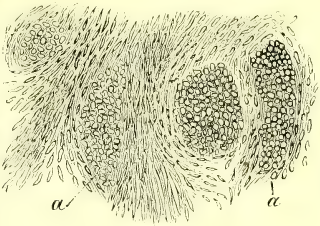

Fig. 157.

The two forms of fibrous growth now spoken of may frequently be found associated together in one tumour. Some are composed of several rounded or oval masses varying in size, enclosed and separated from each other by a cyst, or layer of areolar tissue. The external surface, under such circumstances, is more or less nodulated. It may frequently be observed that some of these nodules are soft and pulpy—semi-gelatinous, with a very sparing layer of fibrous tissue; whilst others may be seen more or less tough, gradually passing into a fibro-cartilaginous density, grating under the knife. Nay, even in one nodule we have frequently observed some parts of it soft and others hard, and shown that the softer parts are mostly cellular, and the harder fibrous, and that between the two there is every degree of variation.

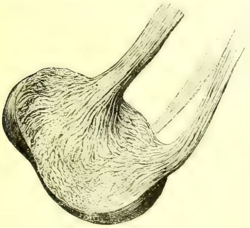

Fig. 158.

Neuromatous Fibrous Tumours.—This form of fibrous tumour is developed in the nerves, sometimes spontaneously, at others is the

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Fig. 157. Section of hard uterine polypus, which had been boiled in dilute acetic acid and dried; *a*, groups of nuclei, surrounded by bundles of fusiform fibres.—(*Wedl.*) 250 *diam.*

Fig. 185. Section of Neuroma connected with three nervous trunks—*Natural size.*—(*Smith.*)

result of injuries, and more especially of amputation. In the museum of the Richmond Hospital, Dublin, I examined a most remarkable series of preparations, taken from two individuals in whom almost every nerve of the body presented knotty swellings. In some places these were developed into tumours, which varied in size from a pea to that of the human head.* A subcutaneous tumour, described by Mr. W. Wood of Edinburgh, must be referred to a similar source.†

All these neuromas, on being minutely examined, are found to consist of fibrous texture, more or less dense, the filaments often arranged in wavy bundles running parallel to each other, but occasionally assuming a looped form, or intercrossing with each other, as in Fig. 155. I have also found them to contain groups of cells, so that on the addition of acetic acid, they closely resemble the structure represented Fig. 157. Not unfrequently they are fibro cartilaginous, sometimes with the cells closely aggregated together, at others widely scattered. Fig. 159. In some of the neuromatous swellings of Dr. Smith's cases, I found the fibrous tissue to present wavy bundles, among which a few granule and cartilage cells were scattered and shrivelled, apparently from the action of spirit. Fig. 160.

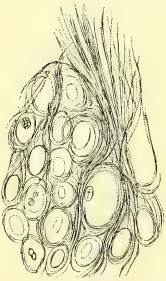

Fig. 159.

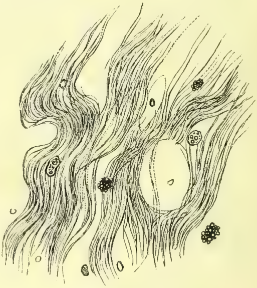

Fig. 160.

Fatty Growths.—Lipoma.

The morbid increase of fat is frequently so imperceptible that it is impossible to separate the pathological from the physiological state. Obesity may gradually increase, either locally or generally, internally or externally, so as to cause, not only inconvenience, but actual disease. Some individuals have become celebrated from their excessive fatness.

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* See Smith's Treatise on Neuroma.—Dublin, 1849.

† Edin. Med. and Surg. Journal, 1812.

Fig. 159. Thin section of a subcutaneous tubercle, composed of fibro-cartilage.

Fig. 160. Fibrous structure of a Neuromatous swelling, given to me by Dr. Smith, from one of the cases he has described. 250 *diam.*

Fat may sometimes occur in masses, being only an exaggeration of the normal texture of the part, as when it collects about the heart, in the omentum, on the serous membranes, in which case the included viscera hollow in it exact models of their form. Fat may also constitute masses in unusual situations, in the form of tumour.

Fatty tumours vary in size, but may reach a growth weighing upwards of 30 lbs. Sometimes their surface is lobulated, at others smooth. They are of a yellow colour, resembling adipose tissue, sometimes divided into bands by white fibrous tissue. The relative amount of these two elements varies greatly in different specimens, some being soft, oily, containing few fibres, others being hard and dense, the areolar tissue preponderating. For the most part they are very sparingly supplied with blood-vessels, but these abound more in the

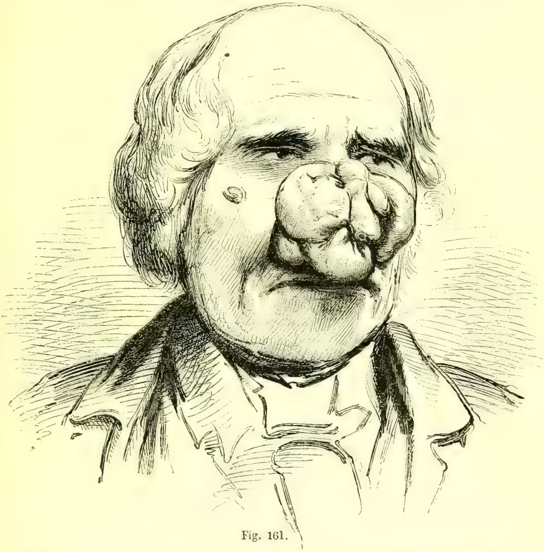
Fig. 161.

Fig. 161. Lobulated Lipoma of the nose.—(*Bickersteth.*)

fibrous varieties. In the latter case they are liable to ulcerate, and, under such circumstances, have frequently been mistaken for cancer. Some of these growths, indeed, may be considered as fibrous or sarcomatous tumours, combined with an unusual quantity of fat. Occasionally they are connected with the ordinary adipose tissue of the body. We see this in fatty tumours so common in the subcutaneous tissue. They are often surrounded by a delicate cyst or envelope; but in others this is not perceptible. It is when the collection of fat resembles the ordinary adipose tissue, that the tumour has received the name of *Lipoma*. When it is more lardaceous, some have applied to it the term *Steatoma*, in the same manner as when the substance is encysted. When firm, and largely mingled with fibres, it may be called *Fibro-Lipomatous*, as in the lobulated tumours that constitute so frightful a deformity of the nose. (Fig. 161.)

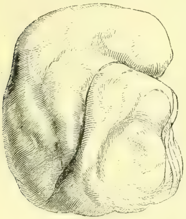
Fig. 162.

The minute structure of these tumours varies according to the amount of adipose or fibrous tissue in their composition. The adipose matter is composed of vesicles of a round or oval form, more or less liable to undergo alterations in shape from pressure. (Fig. 163). They vary from the $\frac{1}{1000}$th to $\frac{1}{350}$th of an inch in diameter; are composed of a diaphanous cell-wall, frequently including a nucleus. The nucleus is

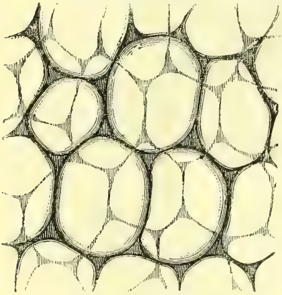
Fig. 163.

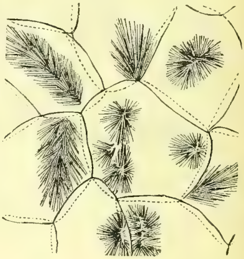
Fig. 164.

Fig. 162. Smooth Lipoma, removed from under the tongue, one-half the natural size.—(*Liston.*)

Fig. 163. Two layers of voluminous fat cells, varying in size from a *Lipoma.* 200 *di.*

Fig. 164. Fat cells from the same *Lipoma*, dried, shewing crystalline bundles of Margaric acid. 250 *diam.*

frequently round or oval, about the $\frac{1}{2000}$th or $\frac{1}{1350}$th of an inch in diameter. Occasionally it is stellate or penniform, of a crystalline appearance, from the formation of crystals of margarine or margaric acid around it (Figs. 164, 165 *a*). On rupture of the cell-wall the oil may be made to flow out loose, and the cell-wall puckers or shrinks up. Such collapsed cells may frequently be seen among the more perfect formations, mixed with globules of oil and fat granules. The fibrous tissue presents the usual appearance of areolar texture running between groups of the adipose cells, being denser, and occupying greater space, according to the proportion with which it enters the tumour. Steatomatous and melicerous fatty matter may consist of the cells just described, mingled in various proportions with granular matter. In some melicerous encysted growths, we have found the whole to be composed of granular matter, in which faint traces of delicate cell-walls might be observed more or less compressed together. In all such productions the relative amount of the vesicular and granular elements varies greatly.

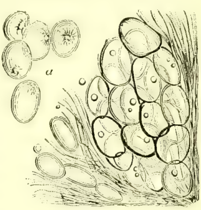

Fig. 165.

An excess of fat may cause the entire disappearance of the usual structure of a part, and its conversion into adipose tissue. The muscular system is very liable to this fatty transformation or degeneration, which often occurs in the heart, and in muscles which have not been much exercised, owing to local disease or paralysis. In this case adipose tissue generally springs up in the cellular substance surrounding the muscular fasciculi, and by its increase and pressure upon them, causes the transverse striæ to disappear, and the whole to assume a granular appearance—(See Fatty Degeneration, Fig. 286).

Cystic Growths.—Cystoma.

The different crypts and follicles of the skin and mucous membrane, as well as several of the excretory ducts of internal organs, may become obstructed, and as a consequence enlarged and hypertrophied. It is true such growths usually consist of one or more elementary tissues, and should not on this account be constituted a class of themselves. Their importance in a practical point of view, however, as well perhaps as the difficulty of knowing where to describe such compound growths, warrant our speaking of them under a separate head.

Encysted growths are composed of a cyst or envelope, enclosing various kinds of contents. They differ greatly in size, situation, and structure, which renders their arrangement somewhat difficult.

Fig. 165. Structure of a *Fibro-Lipomatous* tumour; *a*, isolated cells, showing stellate crystals of Margaric acid. 250 *diam.*

By some they have been divided into *simple* and *compound*, according as the tumour is formed of one cyst, or is composed of several. By others they have been arranged according to the nature of their contents into *hygromatous*, *atheromatous*, *melicerous*, and *steatomatous* growths. The latter mode of division is very faulty, as many of these varieties are only altered forms of one substance—fat, whilst some compound encysted tumours contain various kinds of contents in different cysts. But as there can be no doubt that the peculiar contents give to these growths a distinctive character, we shall first speak of them as simple or compound, and then describe their different kinds of contents.

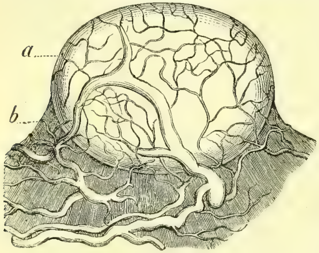

Fig. 166.

Simple cystic growths.—These growths are formed of a cyst generally composed of fibrous tissue, lined by a smooth membrane. Sometimes the membrane is structureless, or only composed of areolar tissue. At other times it is covered with a distinct layer of epithelial cells, the nuclei of which are very apparent on the addition of acetic acid. The former kind constitute the vesicles so frequently found in the plexus choroides, kidneys, ovaries, etc., varying in size from a pin's head to that of a hazel nut, or even walnut, usually with aqueous contents. The latter kind constitute the cystic growths arising in the follicles of the skin, in the mamma, ovaries, testicles, etc., which frequently reach the size of an orange, are sometimes much larger, and vary greatly as to the nature of their contents. For the most part they are only sparingly supplied with blood-vessels, and seldom cause inconvenience except from the deformity they occasion when situated externally.

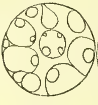
Fig. 167.

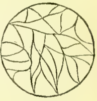
Fig. 168.

Compound cystic growths are of two kinds. 1st, The external sac may contain on its internal surface secondary or even tertiary cysts, which may be sessile or pedunculated—or the growth may be divided into numerous departments by divisions of the fibrous sac. These are the true multilocular encysted tumours. The external cyst in every case is formed of fibrous tissue. The internal surface is smooth,

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Fig. 166. Simple cyst of the broad ligament of the uterus, with very vascular walls. *a*, New vessels; *b*, broad ligament.—(*Wedl.*) 30 *diam.*

Fig. 167. Diagram of compound cystic growth, containing secondary and tertiary cysts, developing themselves endogenously.

Fig. 168. Diagram of compound cystic growth, in which the included cysts are formed by irregular divisions of the fibrous sac.

sometimes with, at others without an epithelial layer. The primary as well as the secondary cysts are for the most part richly supplied with blood-vessels, and hence they are peculiarly prone to contain exudation which may undergo various kinds of development. They may also ulcerate. In the ovary these growths frequently attain an enormous size, measuring several feet in circumference, whilst the cystic internal membranes may secrete more or less rapidly gallons of fluid. 2d, Numerous cysts may be pedunculated from one stock, and more or less crowded together, with a tendency to grow out instead of inwards; as in the case of so called uterine hydatids, but in reality cystic disease of the chorion, as described by Mittenheimer.*

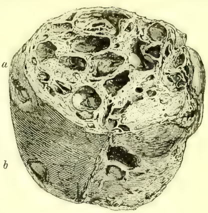

Fig. 169.

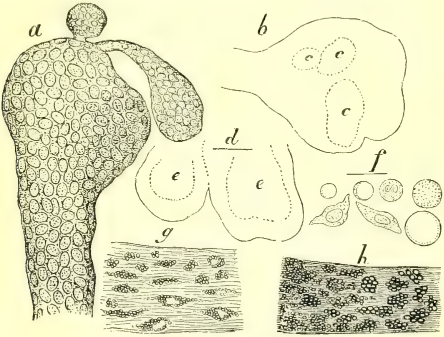

Fig. 170.

The *contents* of cystic growths are very various, and give, as we have previously stated, a peculiar character to them.

1. The contents may be a perfectly colourless fluid, resembling water, or the limpid serum so frequently secreted in the lateral ventricles

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* Muller's Archiv. für Anatomie, etc., 1850, p. 417.

Fig. 169. Compound cystic sarcoma of the mamma. The cysts are more numerous at *a* than at *b*.—(*Miller.*) *One-fourth the natural size.*

Fig. 170. Structure of a cystic chorion belonging to an *ovum*, at the eighth or tenth week.—(*Wedl.*) *a*, An enlarged villus, covered with epithelium, having a globular and a retort-shaped prolongation at its extremity; *b* and *d*, outlines of other enlarged villi, containing hyaline spaces *c* and *e*; *g* and *h*, roots of villi undergoing fatty degeneration. 250 *diam.*

of the brain. It is structureless, and chemically contains a minute proportion of salts, and a certain amount of albumen which coagulates on boiling. Such are frequently the contents of so called serous cysts, or false hydatids of the plexus choroides, kidneys, ovaries, etc. A *Hydrocele*, and other dropsies of shut serous sacs, may be looked on pathologically as constituting a form of hygromatous encysted growth.

2. The contained fluid may have an amber or golden yellow colour, and resemble the serum formed after the coagulation of the blood. It is still structureless, but contains a large amount of albumen, as is proved by the action of heat and nitric acid.

3. The contents are more or less gelatinous, sometimes slightly so, like weak gelatine, at others firm, capable of being cut with a knife like tolerably strong glue or firm calves-foot jelly. The colour of the gelatinous matter may vary from a slight yellowish tinge, to a deep amber, or brownish-yellow colour. Sometimes this matter is structureless, at others it may be seen to contain very delicate filaments, combined with pale oval bodies, the outlines of which become stronger on the addition of acetic acid. (Fig. 172.) This re-agent frequently causes the gelatinous mass to coagulate into a firm white fibrous structure, capable of being separated by needles, and presenting all the structure of filamentous tissue. This kind of contents is common in the thyroid gland and ovary, and we have seen it in the kidney and other organs. On one occasion the gelatinous matter in the kidney, contained numerous granules, and more than once we have found in the centre of clear amber masses of it a creamy white substance, either wholly granular, (Fig. 281), or in the process of formation into pus corpuscles.

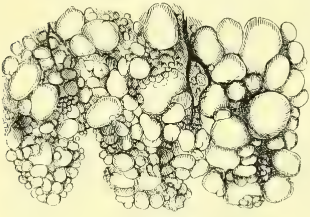

Fig. 171.

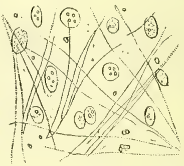

Fig. 172.

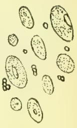

Fig. 173.

4. The cyst may be distended with epithelial cells, which have

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Fig. 171. Colloid cystic growths in three lobules of the thyroid gland.—(*Wedl.*) 15 *di.*

Fig. 172. Delicate oval corpuscles in amber-coloured, transparent colloid matter of the ovary.

Fig. 173. Round and oval corpuscles with filaments in light yellow, semi-transparent gelatinous colloid matter in the ovary. 250 *diam.*

evidently been thrown off from its internal surface, and become compressed together, and partially broken down. Hence on examination, clusters of such scales may be found mixed with numerous debris, and fat granules and globules, sometimes with crystals of cholesterine. The contents of the cysts are usually of a white or slightly yellow colour, sometimes fluid, at others semi-solid. The *molluscum contagiosum* of dermatologists is thus constituted. A small pedunculated simple cyst, dependent from the peritoneal surface of the ovary, was found by Wedl to contain the structures represented Fig. 177.

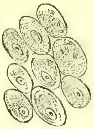

Fig. 174.

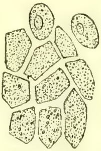

Fig. 175.

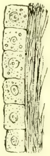

Fig. 176.

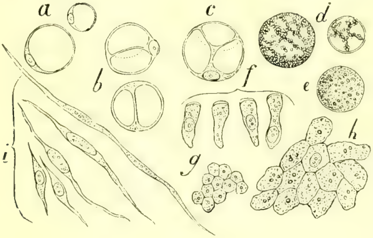

Fig. 177.

5. The contents may consist principally of fat, either amorphous, crystallized, or organized, that is, cellular. If amorphous they resemble honey, constituting the *melicerous* growths of morbid anatomists. In many cases, however, where the yellow colour is uniform, when it breaks down under the finger, and closely resembles honey to the naked eye, faint cell walls more or less compressed together may be observed by the microscope.

At other times the fatty contents are of a whitish colour, occurring in masses of a pearly aspect and smooth surface, mingled with a roughened yellowish, and more granular fatty matter. This white matter consists of numerous crystals of cholesterine placed in a close juxta-position,—the granular fatty matter of oil globules and granules,

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Fig. 174. Oval epithelial cells from the lining membrane of an ovarian cyst.

Fig. 175. Polygonal epithelial cells from the same lining membrane.

Fig. 176. Section of the wall of the same cyst, showing the epithelial cells *in situ*.

Fig. 177. Cells from the interior of a simple cyst. *a, b, c,* Cells developing endogenously, independent of the nucleus, which is embedded in the wall of the parent cell; *d, e,* the same, undergoing the fatty degeneration; *f, g,* cylindrical epithelium, seen sideways and from above; *h,* polygonal epithelium cells; *i,* fibre cells.—(*Wedl.*) 250 *diam.*

mixed with broken up crystals, epithelial scales, and sometimes the products of fibrinous exudation. (Fig. 179). Such is the general structure of the *atheromatous* encysted growths of various authors.

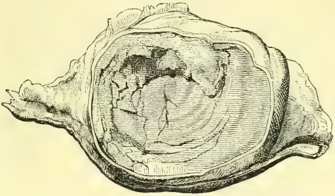

Fig. 178.

Again the fatty matter may be more or less lardaceous in character, and consists of beautiful round or oval cells, some of which are distinctly nucleated. Mixed with these may be a granular matter, combined with epithelial cells or their debris. (Fig. 180.) At other times no distinct cells can be observed, only a granular or amorphous mass, the most part of which is soluble in ether. This constitutes the *steatomatous* encysted growth. (Fig. 178).

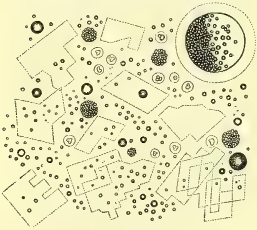

Fig. 179.

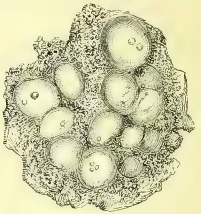

Fig. 180.

6. Many encysted growths contain hair and teeth. The hair is occasionally inserted into the walls of the cyst, at others exists loose, mixed with the fatty or other contents. They are exactly of the same structure as the hairs in other parts of the body, having distinct bulbous roots. When attached they are surrounded by a follicle in the lining membrane, when loose they have been evidently grown in follicles, and afterwards become separated. Their apices are frequently split up into several fibres in the longitudinal direction. The *teeth* belong sometimes to the first, and sometimes to the second dentition. They

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Fig. 178. Encysted tumour, with fatty steatomatous contents. *Natural size.*—(*Liston.*)

Fig. 179. Contents of a large atheromatous cyst, opened by Mr. Syme, consisting of numerous crystals of cholesterine, oily granules, granule and pus cells, with enclosed cysts containing oil granules.—(*Murchison.*) 200 *diam.*

Fig. 180. Adipose cells, embedded in fatty granular matter from a steatomatous encysted tumour of the ovary. 250 *diam.*

present on section the usual structure of cavity, with ivory, enamel, and bone. Sometimes they are found embedded in a follicle of the lining membrane, at others like the hairs quite loose.

7. Occasionally the cysts contain lymph, softened fibrin, and purulent matter, presenting the structure of molecules (Fig. 181), or of pus and granule cells—the result of exudation into their cavities. Occasionally there is a serous fluid more or less mixed up with extravasation of blood, giving to the contained liquid various colours and appearances, according to the period the extravasation has taken place. Thus it may be red, dark brown, resembling coffee, of a dark-greenish tinge, etc. etc. Sometimes it is of a dark bluish or blackish tint from excess of pigmentary deposit.

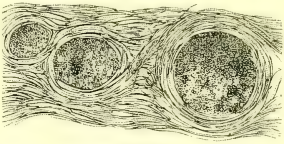

Fig. 181.

8. Sometimes the contents of the cystic growth are formed of a solid exudation, which has undergone the sarcomatous transformation as previously described, and wholly consists of fusiform cells. (Fig. 182.) The exudation poured into such cysts may pass into the cancerous formation, when the characters we have described will be associated with those which distinguish cancer.

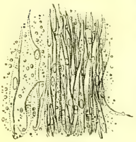

Fig. 182.

9. Some cysts contain the peculiar secretion of the organ in which they are found. Thus cysts in the liver may be full of bile, and those in the kidney of urine.

10. Lastly, cysts may contain a greater or less amount of mineral matter.

The mode in which encysted growths are developed is—1st, By the hypertrophy of pre-existing tissues, whereby, from the accumulation of materials within, canals are distended, follicles or vesicles enlarged, and their walls thickened. Thus the simple cysts in the plexus choroides are owing to effusion of serum into the areolar spaces in the villi of the membrane, and their subsequent distension. Those in the kidney may be owing to the dilatation of uriniferous tubes above an accidental obstruction, in the same manner that the whole kidney may become encysted from obstruction of the ureter. The Malpighian capsules also, or the shut sacs of the thyroid, may be distended with fluid, forming cysts. In like manner the crypts of the skin, the blind sacs of conglobate glands, or follicles of mucous membranes, become obstructed

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Fig. 181 Cysts in cystic-sarcoma of the mamma, filled with molecular matter.

Fig. 182. Fibrous tissue composed of fusiform corpuscles, from a sarcomatous encysted growth in the kidney. 250 *diam.*

at their orifice, and their contents accumulating, gradually distend the walls, which become enlarged and thickened. Simple cysts in the ovary become dilated by enlargement of isolated Graafian vesicles, either deep in the stroma of the organ, or on the surface, when they grow outwards, and become pedunculated.

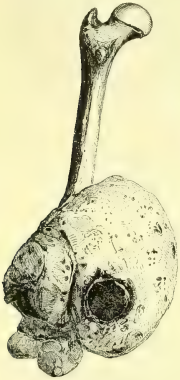
Fig. 183.

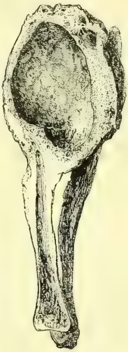
Fig. 184.

This mode of cystic formation, from increasing material that cannot at first readily find an escape, is remarkably well observed in bones, in which cysts are sometimes produced in consequence of accumulated pus. In the Edinburgh University Museum is a remarkable preparation, in which a large osseous cyst has been developed in this manner, at the lower end of the femur, (Fig. 183); and in the Edinburgh College of Surgeon's Museum, is another, which has formed in a similar manner in the head of the tibia (Fig. 184). In the first specimen the osseous cystic walls are thin, in the second they are greatly thickened. In this respect they resemble what occasionally happens in the cranial bones, which in some cases are expanded and rendered thin, and under other circumstances become preternaturally thick.

2d, The origin of compound encysted tumours is not so well determined. It is very probable, however, that in most cases they consist of clusters of simple cysts, which become compressed together, assume an increased power of growth, and are at length surrounded by a capsule. They are most common in the ovary; and here we can readily understand how successive growths of Graafian vesicles may give rise either to the appearance of secondary or tertiary cysts, or to the multilocular form we have described. Once formed, the compound cyst enlarges, the individual ones grow sometimes inwards and sometimes outwards, according as there is more room for expansion in one direction or the other. In the former case they open into each other by ulceration. Hence, in very old compound cystic growths we find one large cavity, with the traces on its internal wall of previously

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Fig. 183. Cystic-osteoma of the femur. *One-eighth the natural size.—(Miller.)*

Fig. 184. Cystic-osteoma of the tibia. *One-eighth the natural size.—(Miller, copied from the preparations above referred to).*

existing cysts, or bands and divisions, with pouches between them. In the latter case they grow outwards, forming clusters of cysts, more or less pedunculated, as in the so-called hydatid moles of the chorion. (Fig. 170, *a*). This endogenous and exogenous mode of growth may sometimes be found in the same specimen.

3d, Another mode in which compound cysts are formed is by the gradual enlargement of the areolæ in newly formed fibrous tissue. On examining thin sections of sarcomatous growths, we observe the filamentous tissue arranged in a circular form, enclosing spaces varying in size. They are often lined by a distinct epithelial membrane, and many contain serum, blood, or exudation, either in a granular or fibrous state. Such growths have long been known under the name of *cystic sarcoma*. (Figs. 185, 186, and also Figs. 169, 181).

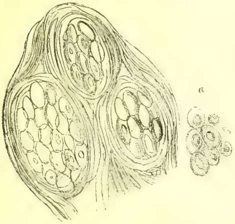

Fig. 185.

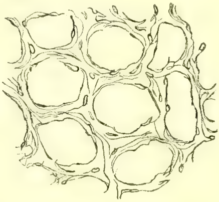

Fig. 186.

4th, The glandular or epithelial cells of an organ assume an increased power of development, and become scattered through its tissue in great numbers. In the kidney especially, a cystic disease is not unfrequently met with, in which the cysts vary from the size of a pea down to the $\frac{1}{1000}$ of an inch in diameter, as may be accurately traced with the aid of the microscope.

The diagnosis and treatment of encysted growths belongs to the *special* pathology of each organ affected by them. It need only be mentioned here that a knowledge of the structure of these tumours is not unimportant, as an examination of the fluids discharged from them frequently enables us to speak with certainty regarding their nature.

Glandular Growths—Adenoma.

Glandular growths are essentially hypertrophies of gland texture, in the same manner that fibrous or fatty growths are an increase of

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Fig. 185. Cysts in cystic-sarcoma of the mamma, crowded with cells; *a*, the cells after the addition of acetic acid.

Fig. 186. Fibrous stroma from another part of the same tumour, with commencing enlargement of the areolar spaces, after the addition of acetic acid. 250 *diam.*

fibrous or fatty tissues. But the structure of a gland is compound, and embraces two kinds of growth, in a definite direction. Strictly speaking, it is a fibro-epithelial growth, but of a kind so peculiar as to warrant Lebert and Birkett, in constituting them groups of themselves.

Glandular growths may be regular or irregular, that is, they may involve the entire gland or only a portion of it, and in the latter case they may assume the form of tumour. They may also be perfect or imperfect, in the first case closely resembling the gland structure, in the second differing from it in various degrees, and passing into fibrous, cystic, fatty, and other forms of growth. It is not our intention to enter into minute descriptions of the various appearances and modifications of structure they present in all the glands. Under the names of chronic mammary tumour, bronchocele, enlarged prostate, and hypertrophied, indurated, or swollen glands, their existence was recognised before their structure was known. While now it has become apparent that growths which are truly glandular in their nature, have frequently been mistaken for fibrous and even for cancerous formations.

These growths are sometimes lobulated, with the lobes more or less compressed, and the interlobular fibrous tissue varying in density and amount. They may reach a considerable size. One, which I carefully examined, removed from the female breast by Mr. Syme, was larger than the human adult head, and weighed upwards of eight pounds. To the feel they vary in density, are lobular or smooth

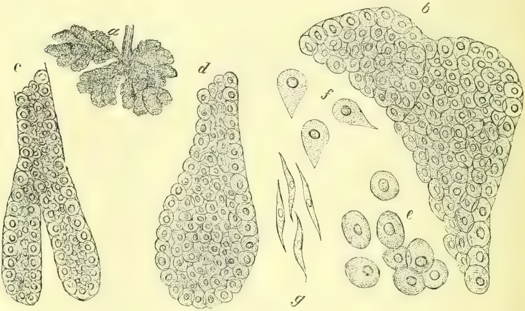

Fig. 187.

Fig. 187. Structure of a cystic glandular tumour of the neck, in the neighbourhood of the thyroid gland. *a*, Appearance of a portion slightly separated and viewed by a simple lens, presenting a grape-like bunch of lobules; *b*, *c*, *d*, ultimate lobules, composed of single or branched cæcal tubes, distended with epithelial cells; *e*, distended condition of these on the addition of water; *f*, alteration of their shape on pressure; *g*, fusiform cells found in small numbers.—(*Redfern.*) 250 *diam.*

externally, and in the latter case are not unfrequently surrounded by a fibrous capsule. On section they are sometimes smooth and glistening, at others somewhat granular and dull. The cut surface varies in colour, sometimes being almost white, at others a pale yellow, pink or fawn colour, apparently from the greater or less amount of vascularity in individual specimens. Their mode of growth is by no means uniform. Sometimes they are indolent and stationary for a long time, or they may increase steadily in size both slowly and rapidly. Occasionally, after giving rise to much anxiety, they gradually disappear, but not unfrequently they present all the external characters and symptoms of fibrous or sarcomatous tumours, and now and then assume all the external features of true cancer.

In structure, glandular tumours consist of gland elements—that is to say, of a basement membrane, furnished with blood-vessels on one side, and nucleated cells or nuclei on the other. According to the amount of fibrous tissue is their firmness, and according to the amount of cells is their softness and friability. The follicles are frequently much distended, presenting blind sacs apparently without ducts, crowded with epithelial cells, more or less compressed together. If ducts do communicate with them, these are similarly distended, as seen in Fig. 190.

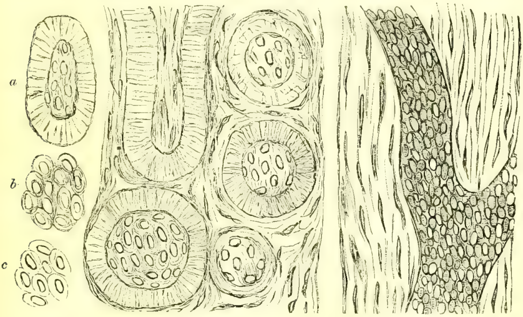

Fig. 189. Fig. 188. Fig. 190.

The thyroid gland is especially liable to a new formation of tissue,

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Figs. 188, 189, and 190. Structure of a glandular tumour, surrounded by a fibrous cyst, removed from the female mamma. Fig. 188. Thin section transverse to the glandular lobules, after the addition of acetic acid, shewing the condensed epithelial lining and enclosed epithelium cells. Fig. 189. *a*, Mass of epithelium separated from the cut lobule; *b*, cellular contents; *c*, the same, after the addition of acetic acid. Fig. 190. Longitudinal section of one of the ducts leading from the lobules, after the addition of acetic acid. 250 *diam.*

first described by Rokitansky, in which embedded in a lax fibrous stroma are rounded vesicles, surrounded by a layer of delicate pavement epithelium, and containing colloid substance, which escapes when one of these is ruptured, Fig. 191 *a*, *B*.* Whether the remarkable structure denominated by M. Robin, "Tumeur Héteradenique,"† in any way resembles this, it is difficult for me to say, never having had an opportunity of examining a specimen.

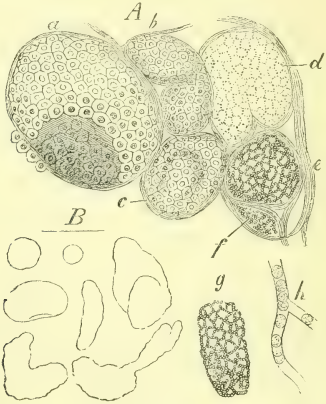

Fig. 191.

Lymphatic glands are very susceptible to enlargement from local irritation arising from a neighbouring ulcer or injury. The mesenteric glands are especially liable to increased growth, in consequence of the various ulcers which form in the intestines. In typhoid fever they may frequently be observed to be swollen as large as hens' eggs, presenting a reddish or purple hue externally, soft and spongy to the feel, on section exhibiting a granular texture and greyish hue, and on pressure yielding a dirty white juice. This juice abounds in the cell elements of the gland, which exhibit an increased power of development. The

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* Zur Anatomie des Kropfes, Wien, 1849.

† Lebert's Anatomie Pathologique Générale et Spécialé, Liv. 10, 11.

Fig. 191. New formed tissue in a follicle of the thyroid gland. *A*, Areolar fibrous tissue surrounding the epithelial-like lining of the areolæ. Many of these have been removed to show the glandular formations within. These vary in shape, some, *b*, *d*, being constricted, others round or oval—*a*, *c*. *B*, Colloid masses of various shapes from the interior of *a*. *g*, Epithelium, with commencing fatty degeneration, seen also at *d*, *e*, and *f*. *h*, Blood-vessels containing colourless corpuscles of the gland.—(*Wedl.*) 250 *diam.*

cells enlarge, their nuclei divide into two, these increase by division into four, or a multiple of these, and often form a cluster in the centre of the cell, as seen in the accompanying figures. (Figs. 192, 193).

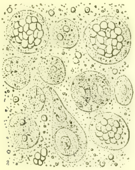
Fig. 192.

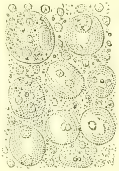
Fig. 193.

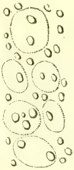
Fig. 194.

The causes which excite glandular growths are not always apparent. They may be constitutional and local, and in the latter case the irritation exciting them may be direct, as from a blow; indirect, as from a neighbouring sore; or reflex, as when uterine disease affects the mamma. Sometimes when the apparent cause is removed, the glandular growth disappears, but at others they continue to grow independently. The laws which regulate the occasional persistence or disappearance of these growths have not yet been determined, but one essential and hitherto unrecognised condition with regard to their independent growth, admits of being explained.

At first the irritation, however communicated to the gland, whether direct or reflex, operates by stimulating it to increased cell-growth, and augmenting the flow of blood. Hence turgescence and enlargement, with the formation of cells, often in such numbers that they cannot readily escape. This is especially the case in the female mamma of young women not pregnant, in whom, while this morbid action is progressing, the proper function of the organ is in abeyance. Hence the follicles enlarge more or less rapidly, and according to the amount of irritation and increased nutrition which result, the consequent amount of growth. It frequently happens, however, that if the increased amount of cell elements can find a ready exit, they retain their normal type for a certain time, and on the cessation of the cause, they cease to be formed or accumulated, and the growth disappears. But when they assume a power of independent development, this is not so readily accomplished. In this case they continue, and by their permanent stimulation to growth, form persistent tumours.

Again, the enlarged glands in the neighbourhood of cancerous, and scrofulous ulcers or growths, are not necessarily owing to the pressure

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Fig. 192. Cells in fluid, squeezed from a mesenteric gland, in a case of typhoid fever.

Fig. 193. The same in another case.

Fig. 194. The same cells, after the addition of acetic acid. 250 *diam.*

of cancer, or tubercle in them. I have frequently examined enlarged axillary glands, removed with cancerous breasts, and found nothing but simple hypertrophy of those glands. In the case of an extensive epithelioma of the thigh, for which amputation was performed by the late Mr. R. Mackenzie, the inguinal glands on the affected side were greatly enlarged. After the death of the individual, I found no epithelioma in those glands, but again only simple hypertrophy. But if this condition be allowed to remain for any length of time, epithelioma as well as cancer does form in them, or simple and tubercular exudations are thrown out, which assume the character of pus or tubercle. It follows that enlarged glands are not a necessary proof of the extension of certain growths secondarily, and that, as we shall subsequently see, their commencement, instead of discouraging, ought perhaps in certain circumstances to render the operation of excision more speedy.

Epithelial Growths.—Epithelioma.

The epidermic and epithelial cells are continually thrown off from the skin and mucous membranes, and new ones are as continually formed. Numerous circumstances may arise which induce their formation in greater numbers, or their accumulation in particular parts. In this case they may soften and give a morbid character to fluids, as that of the urine, or they may become indurated, causing thickenings or swellings on the mucous surfaces, callosities, or tumours of the skin. Structures composed of epidermic growths, as hair or horn, may become excessive, or arise in parts which are unusual. Lebert was the first to point out that many of the tumours hitherto called cystic, fibrous, and even cancerous, belong to this class of growths. In all cases, they consist of an increased number of epidermic or epithelial cells, more or less compressed together, frequently united by filaments of fibrous tissue, and supplied by blood-vessels. The term *epithelioma*, first introduced by Hanover, may be appropriately applied to the entire group.

The following are the principal forms assumed by this kind of growth:—

1. *Corns and Callosities* consist of a local hypertrophy of the epidermis, and are composed of numerous epidermic scales condensed into an indurated mass. The corn is a distinct rounded or acuminated tumour, varying in size from a barley-corn to that of a pea, more commonly surrounded by indurated epidermis. On examining a vertical section under high magnifying powers, it appears irregularly fibrous, but on making a horizontal section these are shown to be the edges of epidermic scales, each of which has its distinct nucleus. Occasionally these cells soften and separate from each other, constituting the soft corn. Callosities of the skin exactly resemble corns in structure, but are diffused over a greater surface.

Both corns and callosities are occasioned by interrupted pressure upon any part of the skin. To a certain extent they protect the delicate nervous filaments below. At other times, from their bulk or hardness, they cause increased pain whenever the pressure is modified or increased. Corns are common on the feet from undue pressure of the shoe; callosities on the knees of housemaids, on the hands of handicraftsmen, sempstresses, etc., or in any other portion of the surface exposed to pressure. The cure consists in removing the cause. We have frequently observed, that during an attack of fever and the subsequent convalescence, all the corns and callosities have disappeared, from the feet, having "grown out," as it is called. Changing the shoe or bootmaker, or obtaining another last, has been known to remove them.

2. *The scaly skin diseases* must be classified among epidermic growths. Accumulations of epidermic scales, upon a reddened and indurated surface, constitute their characteristic features. In *psoriasis* they are gathered together in considerable masses. In *pityriasis* the scales are smaller, are more easily separated from the surface, and frequently associated with minute cryptogamic vegetations. The flattened and imbricated form of *ichthyosis* is also composed of similar accumulations of epidermic scales, but without the reddened surface. (Fig. 79).

3. *Warts and Condylomata* are also, for the most part, composed of epidermic cells condensed together. The wart consists of projections of a papillary form, varying in size, and occurring under circumstances where pressure does not take place. They appear to be constitutional, or associated with peculiar states of the body. Thus condylomata and warts are frequently found round the margins of the anus, vulva, and penis in syphilitic individuals. Warts, assuming the form of cauliflower excrescence, often arrive at a large size in such situations, weighing several pounds. They frequently form on the hands of young individuals, and are frequently found on other parts of the body, coming and going without any obvious cause.

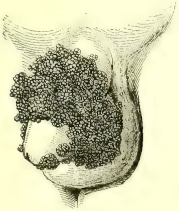


Fig. 195.

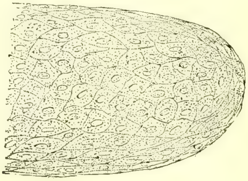


Fig. 196.

Fig. 195. Warts on the penis. *One-fourth the natural size.—(Acton.)*

Fig. 196. Summit of a papilla from a wart. 250 *diam.*

Condylomata, when closely examined, seem to be made up of a congeries of papillæ (*papilloma*), sometimes flattened at the top, so that they cannot be separated; at others, presenting fissures or sulci which lead down to a common stalk. Sometimes the papillæ are small and rounded; at others, elongated and enlarged at their extremities. The tumours thus formed may be only the size of a pin's head, or may be so large as to weigh several pounds. In the latter case the central portions seem to consist of a fibrous structure, probably an hypertrophy of the dermis, which is supplied with blood-vessels. (Fig. 198.) Their surface sometimes is smooth, resembling thickened epidermis; at others is lobulated, composed of rounded groups of papillæ, resembling externally a cauliflower. These tumours, when small, are almost wholly composed of epithelial scales, which assume a square or elongated form, their nuclei being for the most part very distinct. In the larger growths the surface is similarly composed, but internally we find more or less areolar tissue, supplied with blood-vessels. On snipping off a small isolated papilla from such a tumour, and examining it entire, it presents a conical or round projection, covered with epidermic scales, as in Fig. 196. When a vertical section of it is made, we observe a vascular loop, surrounded by basement membrane, external to which are layers of epithelial cells varying in thickness. Those nearest the membrane stand perpendicular, while the external ones are more transverse to it. Fig. 197. The *Verruca Achrocordon* is a peculiar epidermic tumour, furnished with a central canal, through which blood-vessels ramify abundantly to all parts of the tumour. The central parts of such tumours are composed of fibrous structure, (Fig. 198); externally they consist of epidermic scales, arranged concentrically round the central vascular part. If cut into, this gives rise to great hæmorrhage. *(Vogel.)* All

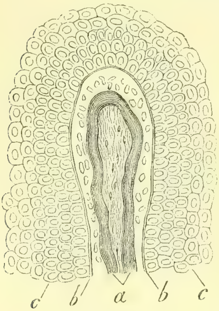


Fig. 197.

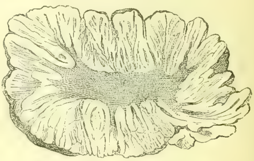


Fig. 198.

Fig. 197. Perpendicular section of a papilla from an accuminate condyloma, after the addition of acetic acid. *a*, Vascular loop—internal to which is fibrous tissue forming the axis of the papilla—outside are nuclei. *b*, *b*, Basement membrane. *c*, *c*, Epidermic cells.—(*Wedl.*) 250 *diam.*

Fig. 198. Transverse section of the base of a condyloma. The dark shading in the centre and radiating lines, represent dense fibrous vascular tissue.—(*Wedl.*)

these tumours may soften and ulcerate on the surface, and, under such circumstances, give rise to purulent and ichorous discharges.

4. Another form of epithelioma is one which frequently commences almost at the first as an ulcer, although sometimes it is preceded by slight induration of, or a small wart on, the part affected. It is common in the under lip, in the tongue, and in the cervix uteri. In the lip there may often be early observed a furrow or groove in the indurated spot or wart, in which the ulceration commences. This slowly extends, with indurated, thickened, and raised margins, is circular and cup-shaped, its surface sometimes covered with a white cheesy matter, at others with a thick crust or scab. (Fig. 199). It slowly extends, until it involves a greater or less portion of the lip and neighbouring parts, pouring forth a foul ichorous discharge. In the tongue, the disease follows a similar course; the base of the sore, however, is generally more fungoid or papillated on the surface, and exceedingly dense, owing to the close impaction and compression together of laminæ of epithelium. These on section present a mass having a white surface, with a tendency to split up and separate, dense to the feel, and not yielding on pressure a milky juice. (Fig. 200.) On the cervix uteri similar ulcers are very common, with hard irregular edges, yielding a copious ichorous discharge, and causing more or less thickening of the neighbouring textures. The so-called cauliflower excrescence is a form of epithelioma, as are the chimney-sweep's cancer of the scrotum, certain forms of rodent ulcer, and of *noli me tangere*. An epithelioma of

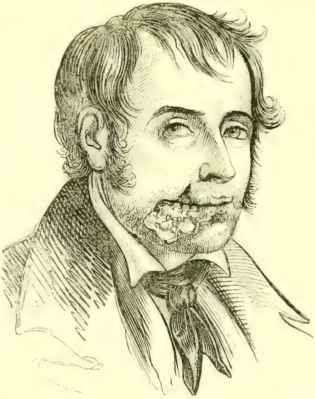


Fig. 199.

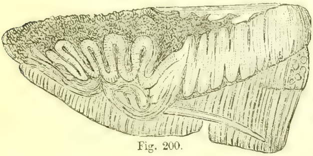


Fig. 200.

Fig. 199. Ulcerated epithelioma of the lip.—(*Liston.*)

Fig. 200. Section of an ulcerated epithelioma of the tongue. *Natural size.*

the hand is well figured by Mr. Paget,* as is a remarkable one in the interior of the stomach by Professor A. Retzius.†

In all these cases, the ulcers, when examined microscopically, present on the surface masses of epithelial cells in all stages of their development. Some spherical and nucleated are about the $\frac{1}{1000}$th of an inch in diameter, others much larger; both often resembling

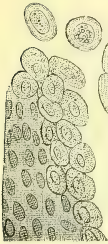
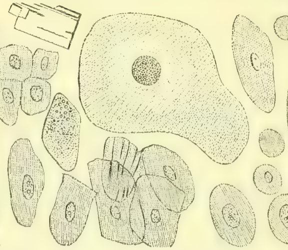


Fig. 201.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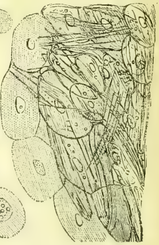
Fig. 203.

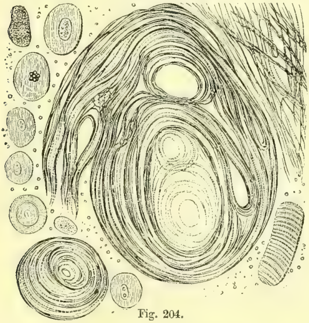
Fig. 204.

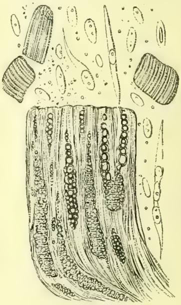
Fig. 205.

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* Surgical Pathology, vol. ii. p. 417.

† Museum Anatomicum Holmiense. Sect. Path. Tab. 7. 1855.

Fig. 201. Epithelial cells compressed together, immediately below the surface of the ulcer, Fig. 200.

Fig. 202. Epithelial cells, one of them very large, in white curdy matter squeezed from the duct, seen Fig. 200.

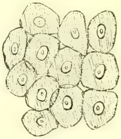
Fig. 203. The same seen in mass.

Fig. 204. Concentric laminæ of condensed epithelial scales, from the lower portion of the white matter seen Fig. 200, with epithelial cells, and fragments of muscular fasciculi.

Fig. 205. Muscular tissue immediately below the white mass. Fig. 200. 250 *diam.*

cancer-cells when isolated or viewed alone, but associated with flattened scales, varying in shape and size, sometimes occurring in groups adherent at their edges, at others mingled together in a confused mass. Many of the cells and scales often reach an enormous size (Fig. 202), and as they become old, split up into fibres. These elements are commonly mingled with numerous molecules and granules, naked nuclei, fusiform, granular, and pus cells. Below the surface the epithelial cells may be seen more or less compressed and condensed together, and when the epithelioma is chronic, and the structure dense, these present concentric laminæ surrounding a hollow space or a cell, evidently owing to the compression together of numerous epithelial scales. This peculiar appearance, sometimes called "cell nests," is characteristic of this form of epithelioma. (Fig. 204). On breaking them up, they exhibit a variety of forms, in which their epithelial character is visible on the one hand, and the fragments of concentric circles are seen on the other.

Fig. 206.



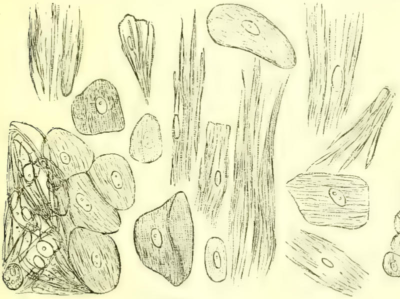


Fig. 207.

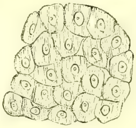


Fig. 208.

The lymphatic glands in the neighbourhood of such ulcers have a great tendency to be secondarily affected, in which case they enlarge, soften, and easily break down under the finger. Not unfrequently they contain a yellow cheesy-looking substance, which, under such circumstances, represents fatty degeneration, analogous to the reticulum of cancerous formations. On crushing a portion of the altered glandular substance between glasses, it presents the appearances represented Fig. 209. If the concentric masses are broken down, the individual epithelial cells are seen here also to be of various fantastic shapes,

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Fig. 206. Epidermic scales in mass, and isolated from the surface of an epithelioma of the scrotum, in a chimney sweep.

Fig. 207. Group of deep-seated cells, in the same case.

Fig. 208. The same, after the addition of acetic acid. 250 *diam.*

in which fragmentary portions of circles are detectable, (Fig. 209). In the yellowish portions the nuclei are composed of fatty granules, and the cells themselves are molecular, and mingled with numerous oily particles. (Fig. 210, also Fig. 85).

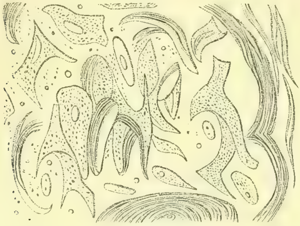

Fig. 209.

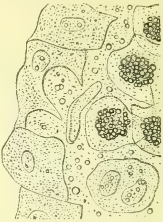

Fig. 210.

A modification of this form of epithelioma occurs on mucous surfaces, especially in the urinary bladder, which has been variously called villous cancer, dendritic vegetation (Zottenkrebs of Rokitansky). It forms a fungous projection, having a fibrous basis which is elongated into branched stems, which support villi, more or less aggregated together, covered with a layer of epithelial cells. It is soft, and readily breaks down under the finger, the pulpy matter exhibiting under the microscope numerous irregularly shaped cells, partly fibrous, and partly epithelial, in various stages of development. (Fig. 211).

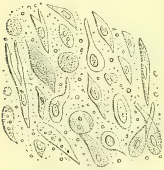

Fig. 211.

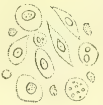

Fig. 212.

5. *Hairy formations.*—Great varieties exist in different individuals regarding the amount of hair on their body. Some men have been known to be as hairy as certain of the lower animals. Patches or groups of hair may frequently be seen scattered over the surface in parts usually smooth, seated on a somewhat indurated base. These constitute a form of so-called mole on the skin. Hair has been found on the surface of the mucous membrane, and even in the lungs. It is

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Fig. 209. Fragments of the concentric masses figured, Fig. 204, from a lymphatic gland.

Fig. 210. Epithelial cells, in yellow cheesy matter, of the same gland.

Fig. 211. Cells in pultaceous white matter, from a soft fungoid epithelioma of the urinary bladder.

Fig. 212. The same, after the addition of acetic acid. 250 *diam.*

common within encysted tumours, especially of the ovary and testis. In several such cases we have found the root of the hair implanted in a follicle, at others loose, with the roots of a bulbous form exactly resembling those on other parts of the body. The point is generally somewhat truncated, presenting at its extremity two or more fibres, from the longitudinal splitting up of the hair. In length they vary from one quarter of an inch to several inches.

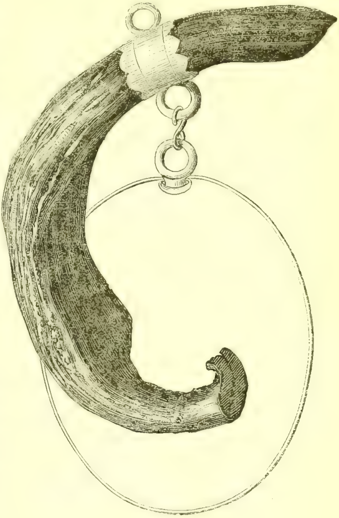

Fig. 213.

6. *Horny productions.*—Under this head may be classed the prominent growths in some forms of ichthyosis; tumours resembling warts, but so indurated as to resemble horn, and true horny excrescences growing from the surface.

In some forms of *ichthyosis*, the growths stand out as distinct spines, broad on the surface, narrow at their insertions, like columns of many sides, accurately fitting to their neighbours. *Horny tumours* occasionally occur, varying in size from a bean, or extending over a space the size of half-a-crown. Many cases are on record of true horn having grown from the surface, especially from the head, originating in some sebaceous follicle. They have grown several inches long, as seen in Fig. 213. On making a section of these productions, they are found to be identical with the structure of true horn in the lower animals, or with that of the nails on the hands and toes. They consist of condensed epidermic scales, which, on the addition of acetic acid, assume all the characters of such structures.

Fig. 213. From an old preparation in the Edinburgh University Museum. The medal attached to it, bears the following quaint inscription—"This horn was cut by Arthur Semple, Chirurgeon, out of the head of Elizabeth Low, being three inches above the right ear, before these witnesses, Andrew Temple, Thomas Burne, George Smith, John Smytone, and James Tweedie, the 14th of May 1671. It was growing seven years; her age 50 years." *Natural size.*

Vascular Growths.—Angionoma.

Vascular growths are formed by an increase in the dimensions or number of the arterial, capillary, or venous vessels. Several growths already described, as well as such as are of a cancerous nature, are very vascular;—indeed, so much so, that in some cases the slightest touch causes alarming hæmorrhage, as in the case of so-called uterine polypi, and fungus hæmatodes. No doubt there is considerable increase of vascular growth in such tumours, but their basis is formed of other material,—they are not wholly vascular. This term is more properly applied to those diseases which have hitherto been denominated *aneurism*, *erectile tumours*, and *varix*.

1. *Aneurism* is an arterial swelling, which may vary in size from the slightest possible dilatation of the calibre of the vessel, either wholly or partially, to the formation of enormous tumours, larger than the human head. In such cases, we find the growth to consist externally of the dilated and hypertrophied structures of the vessel itself, or the tissues in its immediate neighbourhood, whilst its substance is composed of blood, more or less coagulated.

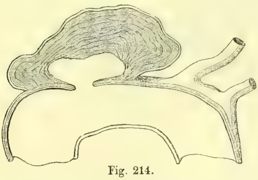

Fig. 214.

The varieties of Aneurism are numerous, but the principal are—1. *Aneurism by dilatation*, in which the whole circumference of the vessel is dilated. 2. *Saccular*, also called *true Aneurism*, in which one portion or side of the vessel is dilated into a sac. 3. *False Aneurism*, in which the coats of the vessel have been ruptured. It has been called *primitive* when all the coats are divided, as by a wound, and *consecutive*, when it is consequent on ulceration or rupture of the internal and middle coats. 4. *Mixed Aneurism*, in which after dilatation, general or partial, of all the coats of a vessel, the internal and middle ones burst, and a false aneurism is superadded. 5. *Dissecting Aneurism*, in which there is laceration of the internal and middle coats, so that the blood becomes infiltrated between the coats of the vessel, separates them for a greater or less distance, and bursts externally at some distance from the internal lesion. 6. *Hernial Aneurism*, in which the external and middle coats are lacerated, and the internal protrudes through them, forming a hernial aneurismal sac. 7. *Aneurism by anastomosis*, in which an artery, by an unnatural communication with a vein causes a pulsating tumour in the latter.

The tendency of these growths is to burst externally or internally

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Fig. 214. True saccular aneurism of the aorta, nearly filled with coagulated clot.—*One-third the real size.* (*After Hodgson, slightly modified.*)

into spaces where least resistance is offered, but occasionally the clot of blood in the interior may coagulate to such an extent as to close up the cavity, prevent influx of fluid, and cause spontaneous cure—a result which is observable in the figure of a very rare specimen of aneurism of the left coronary artery described by Dr. Peacock.* The special pathology of these growths, however, is far too extensive a subject to be entered upon in this place.

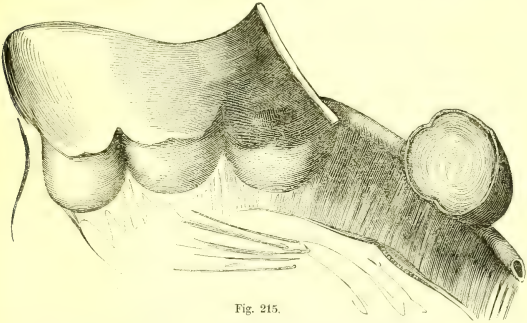

Fig. 215.

2. *Erectile growths*, are generally soft; for the most part situated in the subcutaneous tissue, the skin covering them being of unusual delicacy. When compressed, they may be gradually emptied of blood, which returns like water into a sponge on removing the pressure. For the most part they are congenital. When the arteries are numerous in them, they have a brownish or reddish colour, and pulsate during life. When the veins abound, they are of a blue or purple colour. Their texture consists of numerous capillaries, more or less distended, mixed with arteries and veins, the interstices of which are filled up by areolar tissue. A section presents a spongy texture, composed of fibrous bands closely resembling the appearance of the corpus cavernosum penis, with areolæ or spaces into which the blood enters. The section of a fresh tumour is not unlike that of a sponge soaked in blood. In structure it is composed of vessels of all sizes,

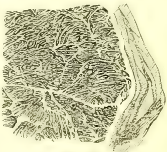

Fig. 216.

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* Monthly Journal of Med. Science. March 1849.

Fig. 215. Aneurism of the coronary artery, completely filled with coagulated clot. *Natural size.—(Peacock.)*

Fig. 216. Section of erectile tumour.—(*Miller, after ?*)

abounding in capillaries, which anastomose freely with each other, and are more or less sacculated or aneurismal. In one case of erectile growth in the liver, I found the intervascular structure to consist of caudate and branched cells, and in another in the brain, I found it loaded with earthy salts.

Varix is a permanently enlarged and tortuous vessel. Swellings from this cause are for the most part venous, and may exist in various

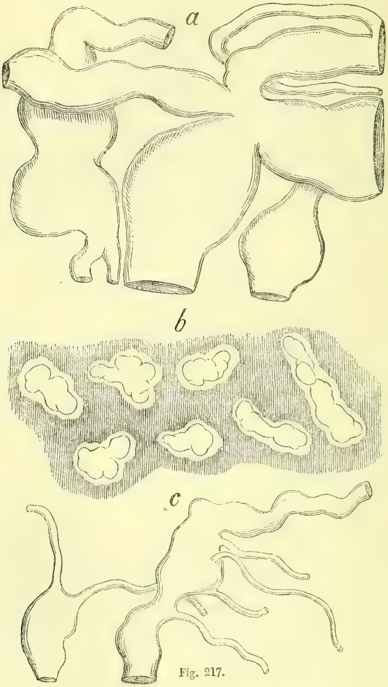


Fig. 217.

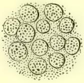
Fig. 217. Varicose cutaneous vessels of the anus. *a*, Vascular dilatations in the subcutaneous cellular tissue; *b*, dilated papillæ of the skin, cut horizontally, the light-coloured papillary structure containing dilated vessels (60 *diam.*); *c*, varicose vessels in the *caput trigonum vesicæ*.—(*Wedl.*) 200 *diam.*

parts of the body, but are frequent in the saphena veins of the inferior extremities, the spermatic veins (*varicocele*), and hæmorrhoidal veins (*hæmorrhoids*). In all these cases the veins gradually enlarge, and then become distended, tortuous, and coiled up. Several of these, accumulated together, may produce knotty swellings in the legs, cause the testicle to assume an unusual size, or produce tumours which, during stool, are protruded beyond the margin of the anus. Such growths may ulcerate, and cause death by hæmorrhage, or they may be spontaneously obliterated by the formation of clots within them. More rarely an artery may become varicose.

Vascular growths, for the most part, consist of hypertrophy by dilatation; no new structures are produced, with the occasional exception of such as arise in the clot of blood within them, which may be converted into fibrous or albuminous laminæ, or into a calcareous mass. In this manner the vessel becomes obliterated, and assumes the density and appearance of ligament.

New vessels constitute one of the most common pathological formations. In the embryo the capillaries originate in independent cells, which throw out arms or prolongations that unite with one another. (Figs. 223 and 224). The larger vessels originate in globular cells which become fusiform, and arrange themselves, some longitudinally and others transversely, to constitute the different coats of the vascular wall. (Figs. 218 to 222). In the adult the observations which have been made in connection with this subject, have led to three theories. 1st, That new vessels are of independent origin, and that they, as well as the blood they contain, spring up in a blastema according to the general laws of cell formation. 2d, That the globules of the blood

Fig. 218.



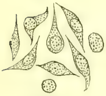


Fig. 219.

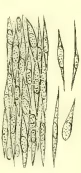


Fig. 220.

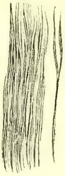


Fig. 221.

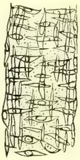


Fig. 222.

Fig. 218. Inner layer of umbilical artery of calf, eight inches long.—(*Drummond.*)

Fig. 219. Succeeding layer in the same vessel, composed of spindle-shaped corpuscles.—(*Drummond.*)

Figs. 220 and 221. Layers more external in the same vessel, in different stages of development into fibres.—(*Drummond.*)

Fig. 222. Common carotid artery of an embryo calf two inches in length, showing different directions of the fibre cells.—(*Drummond.*) 200 *diam.*

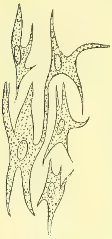


Fig. 223.

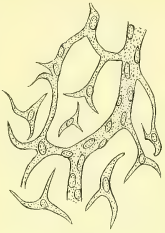


Fig. 224.

escaping from the vessels, channel a way through the surrounding exudation, and thus form new vessels. 3d, That the walls of the vessels themselves at particular places present bulgings and irregularities, which become pushed out more and more by the *vis a tergo*, and so form new channels. An inquiry into this subject is surrounded with difficulties, but all the results of modern research tend to the conclusion, that in exudations, although old vessels, may occasionally send out off-shoots or prolongations, that new vessels for the most part have an independent origin, and are formed as they are in the embryo. Thus in lymph we sometimes observe cells, in all stages of development, towards the spindle-shaped and branched forms, which, according to the observations of Drummond,* and more recently of Billroth,† by their fusion, or by their arrangement side by side, form capillaries of various magnitudes. These afterwards unite themselves with the pre-existing vessels.

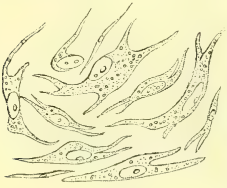


Fig. 225.

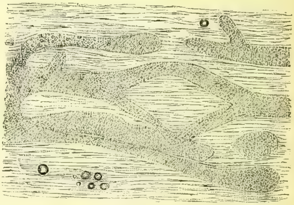


Fig. 226.

Cartilaginous Growths.—Enchondroma.

Cartilaginous growths were first described by Müller, under the

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* Monthly Journal of Medical Science, November 1854.

† Billroth Ueber die Entwicklung der Blutgefässe, Berlin, 1856.

Fig. 223. Stellate cells in the tail of the tadpole, developing into capillary vessels.

Fig. 224. Capillary vessels in different stages of formation, from stellate cells in the eye of the fœtal calf.—(*Drummond.*)

Fig. 225. Branched cells in lymph exuded on the peritoneum.

Fig. 226. Vessels in an early stage of formation, from a colloid tumour of the back. 250 *diam.*

name of *Enchondroma* (Osteochondrophytes of Cruvelhier). When formed in the soft parts, they are surrounded by an envelope of cellular tissue, when in the bones by a bony capsule. In the first case they occur, although very rarely, in the glands, as in the parotid or mamma. In the second case they are most common in the bones of the extremities. They may present rounded, smooth tumours, or may be rough and nodulated from several of them being accumulated together. Though hard to the feel, they often present a peculiar elasticity. They crunch when cut with the knife, usually present a smooth, glistening surface, and are not unfrequently more or less soft, pulpy, gelatinous, and even diffluent in some parts of their substance. They are rarely met with.

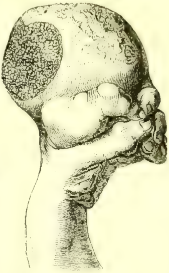


Fig. 227.

In structure, enchondroma presents all the characters of cartilage — that is, nucleated cells varying in size, isolated or in groups, situated in a hyaline substance. A network of filamentous tissue runs through the substance of the tumour, forming areolæ, in which blood-vessels ramify. Within the areolæ so formed, the cartilage is found. These two elements vary as regards amount in different tumours. Sometimes the cartilage is in excess, when it resembles that in young animals, or that in the fœtus. At others the fibrous element abounds, when the whole is similar in structure to fibro-cartilage. Between these two extremes there is every gradation.

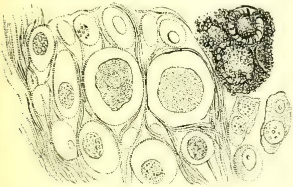


Fig. 228.

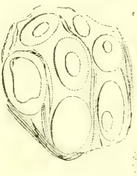


Fig. 229.

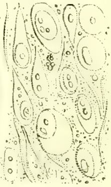


Fig. 230.

Fig. 227. Enchondroma of the hand and fingers. The tumour, of which a section has been made, is enclosed in a bony capsule. *One-fifth natural size.—(Miller.)*

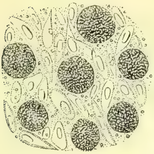
Fig. 228. Structure of a firm nodule in an enchondroma of the humerus. The right of the figure represents, above, mineral deposit in and around the cells, and below, some isolated cartilage corpuscles.

Fig. 229. The same, after the addition of acetic acid, rendering the whole, and especially the nucleus more transparent.

Fig. 230. The cartilage cells and fibrous tissue separated and broken up, with numerous molecules, in a nodule of the same tumour which was soft and in some places diffluent. 250 *diam.*

Occasionally it presents all the characters of articular cartilage. We have seen all these kinds in one tumour. The cells present an extraordinary variety in their size and form, being sometimes large and embryonic (Fig. 228), at others small, (Fig. 231). They may contain

Fig. 231.



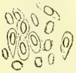


Fig. 232.

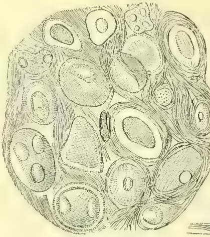


Fig. 233.

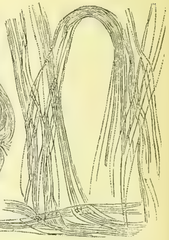


Fig. 234.

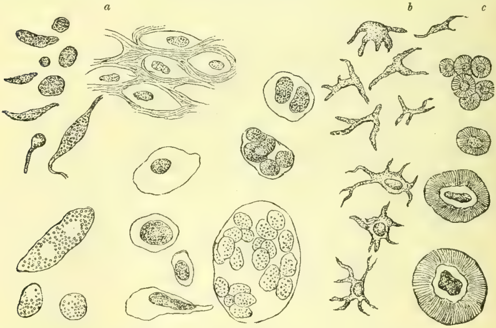


Fig. 235.

Fig. 231. Small cartilage with round granule cells, in the pulp scraped from the section of an enchondroma, which in colour, density, and appearance closely resembled a potato.—(*Solanoma.*)

Fig. 232. The same cartilage cells, after the addition of acetic acid.

Fig. 233. Thin section of a firm portion of the same tumour.

Fig. 234. Fine filaments which interlaced the cells, these having been washed out.

Fig. 235. Great variety of cell forms containing one or more nuclei, observed in an enchondroma of the femur; at *a*, nucleated cells are enclosed in areolar tissue; at *b*, the cells nucleated and non-nucleated possess branched processes; and at *c*, are remarkable bodies of different sizes, with fine radiating lines.—(*Wedl.*) 250 *diam.*

from one to twenty nuclei (Fig. 235). In shape they may be round, oval, irregular, or branched. They may also be associated with numerous granule cells, as in Fig. 231, from a specimen of enchondroma, removed from the integuments of the neck by Mr. Miller, which on section presented the smooth and moist surface of a cut potato.—(*Solanoma.*) (Figs. 231 to 234).

Not unfrequently a bony nucleus may be observed in a nodule of enchondroma, and sometimes they may be observed in all stages of transformation into perfect bone. Some of the exostoses, to be spoken of immediately, are owing originally to an excess of cartilaginous growth.

Enchondromatous tumours are continually mistaken for cancerous growths, as was pointed out by Müller. They are usually denominated *osteo-sarcoma*. Not unfrequently they soften, and under such circumstances, present all the external characters of what is called soft cancer This softened portion, even when examined microscopically, may lead to error, as the cartilage cells which then float loose, mixed with granules and the debris of the tumour, very much resemble those in cancerous growths. They may be distinguished, however, by the action of acetic acid, which affects the whole corpuscle alike, instead of producing, as shown to be the case in cancer, a marked difference between the external cell-wall and the nucleus. (Figs. 229, 238).

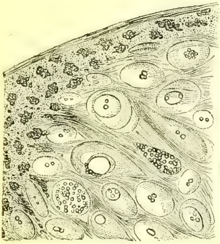


Fig. 236.

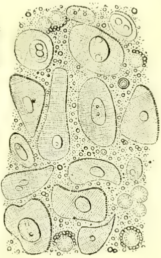


Fig. 237.

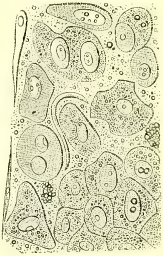


Fig. 238.

Another form of cartilaginous growth is observed in the so-called pulpy degenerations and ulcerations seen in articular cartilage. Goodsir was the first to point out that such ulcerations were in part owing to an increased growth of the cells; and Redfern, whilst he has confirmed this statement, has described and figured all the various changes

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Fig. 236. Thin section of an enchondroma, with a bony capsule, growing from the ischium and pubis.

Fig. 237. Separated cartilage cells from a softened portion of the same tumour.

Fig. 238. The same, rendered more opaque, after the addition of acetic acid. 250 *di.*

observable in those cells, and in the inter-hyaline substance in the different diseases of cartilage in man, and many of the lower animals. In consequence of his researches it is now ascertained that the cartilage cells enlarge, and, as Goodsir pointed out gradually, contain a mass of included ones. These burst into the surrounding hyaline substance, give it unusual softness, and cause it to swell. At the same time the hyaline substance fibrillates, and splits up, a change best observed on the surface occasioning that villous and rough abraded appearance so commonly observed in diseased joints. Mechanical injury inflicted on these structures produces the same results, showing that both it and disease operate by stimulating cell nutrition and growth. (Figs. 239, 240, 258).

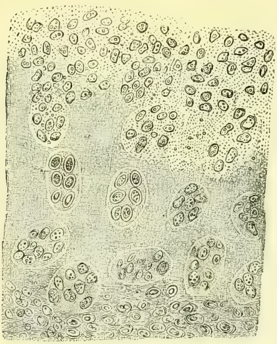
Fig. 239.

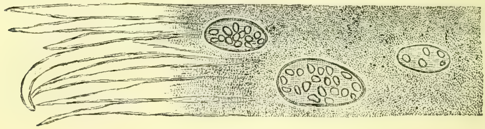
Fig 240.

Osseous Growths.—Osteoma.

We have seen that in many of the cartilaginous growths deposit of bone may take place to a greater or less extent. In such cases, the new cartilaginous tissue undergoes the true bony transformation, in the same manner that normal cartilage becomes ossified in passing from the fœtal state through the periods of youth, manhood, and old age. This we must separate from the numerous forms of calcareous concretions so frequently met with. True bone may be at once recognised by its osseous lacunæ and canaliculi. Earthy concretions only consist of an amorphous mass of mineral material. (Compare Figs. 248 and 327).

Fig. 239. Diseased articular cartilage, showing the enlargement of the corpuscles, the increase of nuclei within them, and their escape into the intercorpuscular softened substance.—(*Redfern.*)

Fig. 240. Vertical section of cartilage from the surface of the patella, showing the fibrous splitting up of the hyaline substance.—(*Redfern.*) 250 *diam.*

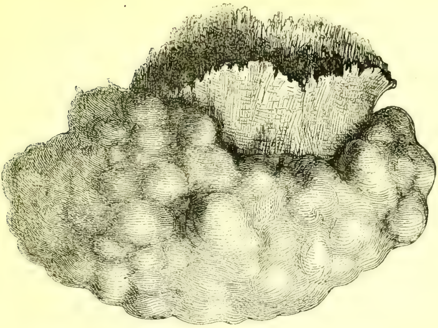

Fig. 241.

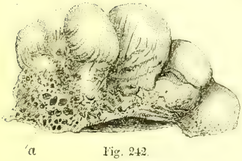

Fig. 242.

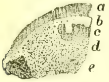

Fig. 243.

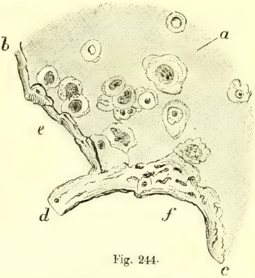

Fig. 244.

Osseous growths may affect the external surface, the substance, or the internal surface of bone. In the first case they are denominated *exostoses.* They form prominences on the surface of the bone varying

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Fig. 241. Nodulated exostosis attached by an osseous pedicle to the inferior and inner portion of the femur of a woman, æt. 23. It had been growing from her earliest youth, was accidentally broken off by a blow, and shortly after excised by *Mr. Syme. Natural size.*

Fig. 242. Lateral view of an exostosis, removed from the posterior and inner surface of the humerus, two inches from its head, by Mr. Syme. At *a*, a piece of the tumour has been broken off, showing the cancellated structure of the interior.—(*Lister.*) *Real size.*

Fig. 243. Part of a section through one of the prominences of the tumour. ***a***, Superficial cartilage; *c*, a portion of deep-seated cartilage, surrounded by dense bone; *b*, and *d*, *e*, calcified cartilage not so dense as the more superficial portions.—(*Lister.*) *Real size.*

Fig. 244. Section of a portion of the tumour, at the line of junction of the calcified cartilage, and the cancellous structure of the interior, the earthy matter having been removed by dilute hydrochloric acid. *a*, Cartilage, with its cells changed by the process of calcification; *b*, *c*, is true bone, containing laminæ, lining the excavations in the calcified cartilage; *d*, part of a spiculum of the cancellous structure; *e* and *f*, spaces formerly occupied by medullary substance.—(*Lister.*) 200 *diam.*

in size from a small point to that of a cocoa nut. There is no part of the osseous frame free from them, but they are very common in the bones of the extremities. They may arise as the result of direct local injury, as from a blow or fall, or they may be connected with peculiar constitutional diseases. In syphilitic constitutions, exostoses more especially arise on the shafts of the long bones; in rheumatic persons, they surround the joints.

Many of these growths on the surface of bones have not been shewn to originate in cartilage as the bones themselves do. But in others, there can be no doubt that such is their mode of growth, viz., matter thrown out from the blood, which is first converted into cartilage and then into bone. (Fig. 244). In this manner enchondroma may be converted into osteoma. The growths in which this change is observable generally present roundish masses. They may be intensely hard or eburated, or comparatively soft and cancellated. This is owing to the bone texture being more compact in the one case, and more spongy in the other. Externally they may be covered with a layer of cartilage, and a smooth membrane. (Fig. 241).

Bony growths may more especially affect the substance of bones, and this in two ways. An exudation may be poured into the cancelli of the osseous texture, which is gradually transformed into perfect bone. From this cause its substance becomes much indurated and of great density, and the cancelli and medullary cavity are more or less obliterated. We frequently observe this in the long bones of the inferior extremity as well as in the flat bones of the cranium. Some of the latter have thus become upwards of an inch in thickness, and on section presented the close texture and density, although not the structure of ivory. Sometimes, however,

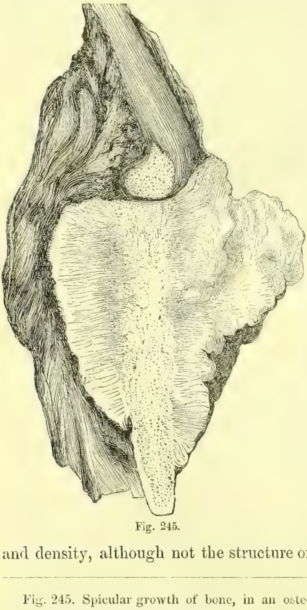

Fig. 245.

Fig. 245. Spicular growth of bone, in an osteo-carcinomatous tumour of the tibia. *One-fourth the natural size.—(Syme.)*

the bones, instead of being condensed and thickened, become spongy, the cancelli enlarge, and the whole assumes unusual lightness. In this case, the exudation poured into the cancelli is transformed into pus, and acts as a distending power, and sometimes collects in a central cavity, causing at the same time expansion and hypertrophy of the surrounding osseous tissue. (Figs. 183, 184). On other occasions the new osseous growth assumes the form of spicula, radiating from the shafts, a result most common in cases where the bone is the seat of sarcomatous or cancerous formations, through which they ramify. (Fig. 245).

Bony growths are sometimes thrown out on the internal surface of the cranial bones. This occurs in a peculiar disease first described by Rokitansky in puerperal women. I saw this production frequently in Berlin, on the internal surface of the cranial bones, in the numerous dissections which occurred in the Maternity Hospital of that city during an epidemic puerperal fever which raged there in 1840. Unfortunately, they were not examined microscopically. The internal table of the skull in all these cases was so soft, that the knife could readily penetrate it. These deposits, when dry, assume a granular laminated aspect, more or less curled up and separated from the internal lamina of the cranial bones. Very fine specimens of this lesion are to be found in the pathological museums of Prague and Vienna.

There is a form of growth generally originating in bone, which is soft, easily breaking down under the finger like rice-pudding or marrow (hence called *myeloid* by Mr. Paget). It has frequently been confounded with soft cancers, as pointed out by Lebert, and in addition to fibrous and fusiform cells contains others of a round or oval form, varying in size from the $\frac{1}{800}$th to the $\frac{1}{300}$th of an inch in diameter, having in their interior from two to twenty nuclei. These growths occur in various situations, but are most common in bones, especially of the jaw, constituting certain forms of *epulis*. (Figs. 246, 247). The large cells often contained in the friable matter of such growths (Fig. 247), closely correspond to the many nucleated corpuscles described by Kölliker, as occurring in the marrow of fœtal bones.* A remarkable example of it is figured by Mr. Paget, occurring in the bones of the cranium, and in the brain.†

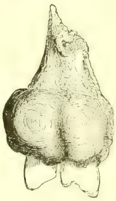
Fig. 246.

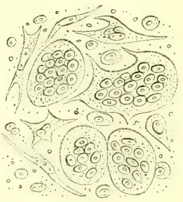
Fig. 247.

Fig. 246. Epulis removed from the upper jaw. *Natural size.*—(*Syme.*)
Fig. 247. Cells with many nuclei in epulis. 250 *diam.*

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* Manual of Human Histology, vol. i. fig. 7.

† Surgical Pathology, vol. ii. p. 222. The peculiar character and structure of these

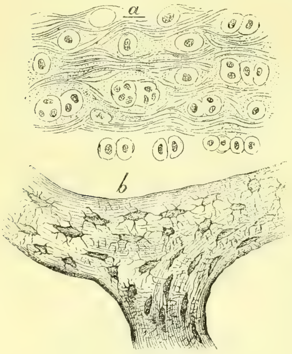

Fig. 248.

The growth of *new bone*, after fractures or injuries, takes place in the following manner :—An exudation is poured out from the vessels in the neighbourhood, which at first unites the lacerated edges of ruptured periosteum, muscle, and cellular tissue, so as to form a capsule around the whole of the denuded and injured bone. This exudation, at first granular, is partly transformed into fibrous tissue, and partly into compound granular corpuscles, which may be observed to form an internal coating to the capsule just alluded to. The blood extravasated is rapidly absorbed, and a gelatinous exudation, which is poured out from the neighbouring capillaries, collects between the capsule and denuded bone. This, at first yellowish, becomes gradually lactescent and white, and assumes all the characters of fibro-cartilage. (Fig. 248, *a*). This cartilage, in its turn, is transformed into bone, by exactly the same process as the one structure passes into the other in the normal state. As solidification takes place, the soft parts are absorbed and contracted, whilst the bony growth, in the form of spicula, forming the boundaries of large cancelli, (Fig. 248, *b*), insinuates itself between and around the fractured bones, producing complete union.

Certain textures have been occasionally transformed into true bone. I examined the preparation of an eye at Munich, in the possession of Professor Förg, which contained an osseous mass, attached internally to the choroid and fibrous structure of the sclerotic, and encroaching considerably on the space usually occupied by the vitreous humour. A thin section of it exhibited numerous bony corpuscles. A similar osseous transformation of the choroid membrane and lens has been described and figured by Dr. Kirk,* in a diseased eye of thirty years standing.

growths may ultimately warrant their being classified among the primary division of tumours, under the name of myeloma. But at present our acquaintance with them is limited, and the many nucleated cells, which is their chief characteristic, I have seen in growths presenting all the characters of sarcoma, adenoma, epithelioma, and enchondroma.

* Monthly Journal of Medical Science, November, 1853.

Fig. 248. *a*, Fibro-cartilage formed between the separated portions of a fractured *cervix femoris*; *b*, new osseous structure, in the form of a bony spiculum or trabecula between the large cancelli, from the same fracture.—(*Wedl.*) 250 *diam.*

(Figs. 249, 250, 251). I have seen true bone formed in the substance

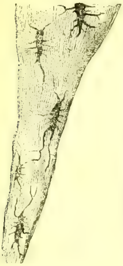

Fig. 249.

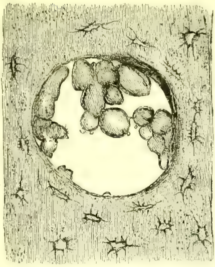

Fig. 250.

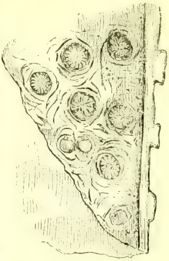

Fig. 251.

of the dura mater, where it has been exposed after removal of a portion of the cranium by the trepan. The osseous laminæ, sometimes found on the surface of the spinal arachnoid, also possess the true bony structure.

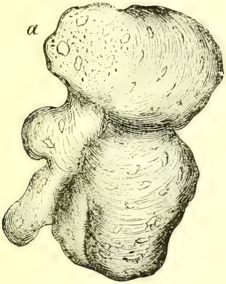

Fig. 252.

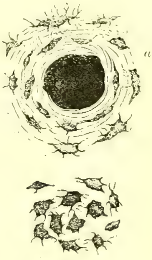

Fig. 253.

(Fig. 252.) Ligaments have occasionally been transformed into osseous

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Fig. 249. Spiculum of bone projecting from the choroid membrane.—(*Kirk.*)

Fig. 250. Section from the centre of the crystalline lens, of stony hardness from osseous transformation. In the centre are spheroidal mineral masses, composed of carbonate mixed with phosphate of lime.—(*Kirk.*)

Fig. 251. Loose membranous matter, like the collapsed pith inside a quill, found in the anterior chamber of the same eye. On one of its surfaces were projecting tubercles with a radiated structure.—(*Kirk.*)

Fig. 252. Ossified excresence on the arachnoid of the thoracic portion of the spinal cord; at *a*, a portion is cut across.—(*Wedl.*)

Fig. 253. *a*, Bony laminæ arranged concentrically; *b*, others arranged irregularly in partially ossified fibrous tumour of the uterus.—(*Wedl.*) 250 *diam.*

texture (Henle); the calcareous concretions occasionally found in the centre of fibrous tumours, though generally composed of amorphous mineral matter, are sometimes formed of true bone, (Fig. 253, *a*, *b*); and Dr. Wilkinson of Manchester communicated to the Pathological Society of that city an instance where numerous muscles of the body had undergone a like transformation. In all these cases the osseous structure is formed on a fibrous and not on a cartilaginous basis, an occurrence which may be accounted for by the analogy which exists between cartilage and certain forms of fibre cells. Many kinds of morbid fibrous growths contain cells and nuclei, which present all degrees of intermediate formation observable in those of fibrous, cartilaginous, and osseous textures.* (Compare Figs. 156, 235, 248 *a*, 252, 253).

Of earthy depositions which frequently resemble them to the naked eye, whether amorphous, or assuming a regular form from accidental circumstances, I shall speak more at length under the head of Concretions.

Cancerous Growths—Carcinoma.

By a cancerous, as distinguished from any other kind of growth, may be understood nucleated cells, presenting the characters previously described and figured (pp. 140, 141), infiltrated among the meshes of a fibrous stroma, or among the normal structure of an organ. If the fibrous element be in excess, it constitutes scirrhus or hard cancer; if the cells be numerous, we have encephaloma or soft cancer, and if the fibres form loculi, containing a gelatinous or glue-like matter containing the cells, it is colloid cancer. All these forms of cancer may occasionally be observed in the same growth, the fibres, cells, and gelatinous fluid being more or less abundant or isolated in different places. The character of nucleated cells, imbedded *in* a tissue, separates cancer from all other growths, with the exception of fibro-cartilage, in which, however, the translucent appearance of the cells, and their different behaviour under the action of acetic acid, are sufficiently distinctive. (See Cancerous Exudation).

In no general consideration of morbid growths can cancer be overlooked; but like pus, it is an *exudative* growth, and foreign or heterologous to the tissues. Hitherto, however, it has so mingled itself in all our notions concerning tumours, and practically it so meets us when we come to consider their diagnosis and treatment, that we are constrained in our general views of this subject, constantly to keep it in view. Hence, as a growth, we shall in the following remarks speak of it under the name of Carcinoma, the general aspect of which is represented in the accompanying figures, showing the scirrhoid, recurrent, and fungoid appearances of the disease, when it attacks the mamma.

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* See Memoir on Calcification and Ossification of the Testicle, by Mr. J. S. Gamgee, in Researches on Pathological Anatomy, etc., 8vo. 1856, published when this sheet was going to press.

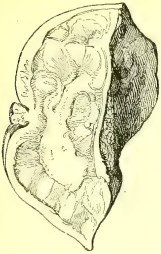

Fig. 254.

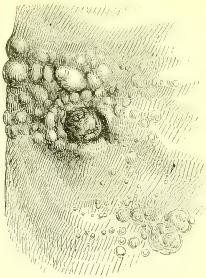

Fig. 255.

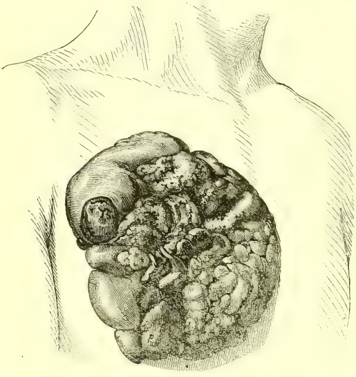

Fig. 256.

General Pathology of Morbid Growths.

The general pathology of morbid growths comprehends a consideration of their origin, development, propagation, and decline. It is

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Fig. 254. Carcinoma of the breast, at an early stage (Scirrhus) after being cut out and bisected, the nipple retracted.—(*Liston.*)

Fig. 255. Returning carcinoma in the breast, after operation, presenting a series of nodules in and around the cicatrix. One in the centre has ulcerated.—(*Cruvelhier.*)

Fig. 256. Advanced carcinoma of the mamma, exhibiting a prominent, fungoid, and bleeding mass.—(*Cruvelhier.*)

impossible to over-estimate the importance of this subject, as it is a knowledge of it which can alone furnish us with correct principles of treatment. Doubtless many facts are yet to be discovered as to the structure, chemical composition, and mode of formation of morbid growths; but enough has been ascertained of late years from combined histological and clinical research, to necessitate great modifications in the views previously held regarding them. The following account, it is only right to say, is derived not only from careful study of what has been written by others, but from a large amount of original investigation.

Origin of Morbid Growths.—All morbid growths consist—1st, In augmented development of pre-existing textures (so called homologous or homeomorphous growths); 2d, Of new elements which have no previous existence in the economy (so called heterologous or heteromorphous growths); and 3d, Of these two sorts of growth mingled together. The causes which induce them are of two kinds—1st, Local irritation excited directly or indirectly; and 2d, Constitutional or unknown changes, supposed to operate through the blood. Thus the direct stimulus of a blow may so irritate the parenchyma of a part, as to excite increased nutritive action, so causing hypertrophy, or it may give rise to an exudation; and irritation at a distance may, through the nervous system, produce like effects, as when the female mamma is influenced by the state of the uterus. If, on the other hand, the constitution be affected, such local changes may assume peculiar characters. In this manner age, sex, hereditary predisposition, and concomitant disorders, as syphilis and cancer, not only modify but give rise to morbid growths.

It has been a favourite idea with pathologists that morbid growths have fixed tendencies from the beginning, such as are impressed upon the ova of various animals, in virtue of which they are necessarily developed in certain directions. If so, this is not traceable to any peculiarity of structure or chemical composition. In this respect morbid growths are like healthy ones, which, however different in ultimate composition, all originate in a finely molecular blastema. A commencing small white nodule of cancer in the stomach, about the size of a split pea, was ascertained by me to present exactly the same kind of molecular matter, exuded in the areolar tissue between the muscular and mucous coats as occurs in simple exudation. A careful

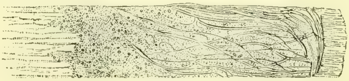
Fig. 257.

Fig. 257. Section of small commencing cancerous nodule, growing from the mucous coat of the stomach, showing molecular exudation between the epithelial and muscular coats. *a*, Epithelium; *b*, muscular coat. No glands were visible. 250 *diam.*

observation of the subsequent development of these growths, however, seems to indicate that specific differences are not impressed upon them from the first—that one does not as a matter of course exclude the other, and that any of the classes into which they have been divided may supervene upon pre-existing ones. For instance, persons may have a fibrous or glandular growth, and after a time its blood-vessels may pour into it a cancerous exudation, or this latter may undergo a fibrous or fatty transformation. It is only in this manner we can explain numerous cases, which are daily observable in practice, where indolent fibrous tumours suddenly assume increased power of development and become cancers, or where these last slough out and subsequently cicatrize.

Besides these constitutional causes, locality and the nature of pre-existing textures have a considerable influence on the formation of morbid growths. Thus, as a general rule, fibrous growths are common in fibrous textures, cartilaginous and bony growths in osseous ones, epithelial growths on epidermic and mucous membranes, and so on. Yet, even here, the system generally occasions differences. For example, osseous growths in rheumatic constitutions occur at the extremities of long bones; but in syphilitic ones choose in preference their shafts. In youth, epithelioma occurs in the form of warts on the hands; in syphilitic people, it occurs in the genitals; in chimney-sweeps, on the scrotum; in smokers, on the lips, etc. This conjoined influence of constitution and locality indicate the complex causes necessary to produce the results, a study of which is of the greatest moment to the physician, who is desirous through the former of operating on the latter, or the contrary—as previously explained in the sketch of the function of nutrition.

Development of Morbid Growths.—All morbid growths once formed continue to grow according to the histological laws which regulate development in the textures generally—that is to say, after arriving at a certain point, they attract from the blood-vessels in the neighbourhood, or from such new ones as are formed within themselves, the nutritive materials whereby they augment in bulk. In voluntary muscular fibre, this appears to be accomplished by the fasciculi multiplying fissiparously. They divide as represented in the figure, and hypertrophy is occasioned by multiplication of parts. (Fig. 132). In non-voluntary contractile fibre, also, the individual fusiform cells multiply, enlarge, and elongate, a change well observed in the pregnant uterus, in which organ many of the small non-contractile spindle-shaped fibres enlarge, become contractile, and then undergo the fatty degeneration, break down, and ultimately disappear. (Fig. 288). In the same manner the elementary parts in hypertrophies of other textures, augment fissiparously or endogenously as in bone and cartilage. That this may be the result of local irritation is remarkably well shown by an experiment of Dr. Redfern's. Having made an incision into the cartilage of the patella of a dog, he found, on subsequent examination, that the cells had enlarged in the neighbourhood of the divided tissue, and nearest the osseous vessels, as seen Fig. 258.

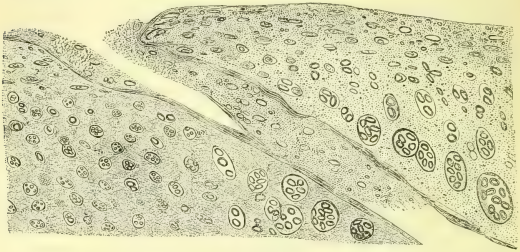

Fig. 258.

Other forms of morbid growth, especially tumours, are very variable as to rapidity of increase and volume ; but the manner in which the development is accomplished is of three distinct kinds. 1st, The elementary textures are produced in the same manner as they are in adult tissues. They are either more numerous or larger, but preserve their normal relation and mode of arrangement (lipoma, adenoma, angionoma). 2d, A matter is thrown out from the blood, which serves as a blastema for the formation of cells, which may be detected in various stages of development, undergoing the same changes that similar textures are seen to present in the embryo (fibroma, osteoma). 3d, The cells, whether pre-existing or newly formed, assume such a property of self-multiplication that their normal relation and mode of arrangement is destroyed (epithelioma, enchondroma, carcinoma). These three modes of increase may occur singly or united. Any one or two of them may be superadded to the third, and their occurrence at different times and in various proportions accounts to a great extent for the apparent anomalies exhibited in the progress of individual growths.

The third mode of development just alluded to deserves special consideration. It consists of the same kind of endogenous multiplication of cells, with this difference, that sometimes these cells previously existed, whilst at others they have been newly formed in an exudation. To explain my meaning, I must beg the reader to consult the two figures which follow—one by Kölliker, representing cell structures in the softened articular cartilage of man, and the other by Redfern, showing similar formations in a cancerous exudation into the

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Fig. 258. Appearance of cartilage on each side of an incision made into the patella of a dog ; thirty days afterwards, the cells were found enlarged, with internal multiplication of nuclei.—(*Redfern.*) 250 *diam.*

brain. In both a similar mode of cell development will be perceived, yet the one takes its origin in pre-existing articular cartilage cells,

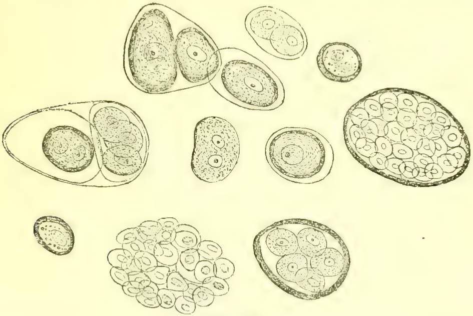

Fig. 259.

whilst the other must arise in the new cells of an exudation, as the white substance of the brain contains no corpuscles from which they could be developed. In the cornea and epithelium similar changes occur, as well as in the bones and mesenteric glands. Yet these

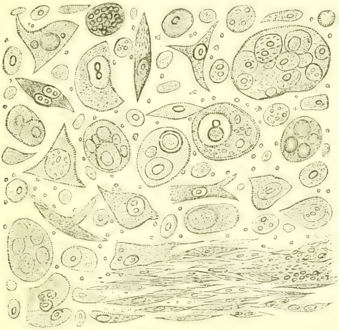

Fig. 260.

lesions, so closely allied in their essential nature, have in these different textures been called different names and widely separated pathologically.

Fig. 259. Cartilage cells from a velvety articular cartilage of the condyle of the femur of a man.—(*Kölliker.*) 350 *diam.*

Fig. 260. Cells from a cancerous tumour of the brain.—(*Redfern.*) 250 *diam.*

In the non-vascular cornea and cartilage, it has been called inflammation, but in the equally non-vascular epithelium, it has been named cancer. Again, in the vascular bones and glands, it has received various names, such as osteo, or medullary sarcoma, enlarged glands, etc.; whilst in the brain and other localities it has been called encephaloma, or soft cancer. It seems to me that in all these cases the lesion is the same, and that an advanced knowledge of their nature should lead us to group them together—calling some of them inflammation and others cancer, supposing the first to be innocent and the last malignant, is, we contend, incorrect pathology. True theory points out that all these lesions are equally destructive, in consequence of increased endogenous cell growth, and practical experience has long determined the question of their being alike difficult to control.

As a general rule, the greater the number of cells any growth contains, the more rapidly it extends. Hence why a tumour is subject to the laws which govern the development and multiplication of cells in addition to those connected with locality and the general powers of the constitution. Thus, room for expansion and the amount of temperature and moisture exercise undoubted influence over morbid growths. We see the influence of room for expansion in the cases of adenoma and carcinoma. In adenoma the cells are confined within pouches or ducts. (Figs. 187, 190.) They become crowded on each other; and thus, by means of compression, tend to atrophy and breaking down, rather than to self-multiplication. This is assisted if the distension from within so irritates the fibrous stroma of the gland that it becomes hypertrophied, and occasions a further obstacle to expansion around the seat of cell increase. In carcinoma, we observe that the growth takes place in extent and rapidity, proportionally to the number and power of expansion in the cells. If compressed by much fibrous or hard tissue they multiply slowly; but if an ulceration occurs, say in the skin, then they become developed rapidly and constitute the so-called soft fungoid excrescences. Heat and moisture, as they are essential to cell growth throughout the animal and vegetable worlds (increased temperature with fluidity favouring—cold, and dryness checking it, within certain limits) so the influence of these physical agents may be observed to be equally powerful in morbid growths. Rapid augmentation of a tumour is generally accompanied by increased heat and softening of the parts, whilst colder and harder swellings develop themselves slowly.

Propagation of Morbid Growths.—It has seemed to most pathologists that while some morbid growths are local, and if removed by the surgeon, do not return, others are constitutional or general, and if cut away exhibit a great tendency to come back. The former have been called innocent or benignant, and the latter malignant. So far has the notion of malignancy in certain growths been carried, that surgeons have refused to remove them, not because they are inaccessible, or so connected with anatomical parts as to render the operation directly dangerous to life, but simply because they thought the disease was in the blood, and that cutting away the local swelling would either be useless, or give increased activity to the lesion.

Firmly believing that many valuable lives have been sacrificed to this erroneous principle of practice, I endeavoured to combat it in my work on cancerous and cancroid growths, published in 1849. The progress of medical science since then has fully confirmed the truth of my opinions on that subject, as cases are now on record where every kind of morbid growth has been proved to be malignant, even in the worst sense of those who use that term, whilst others, which the most experienced surgeons, as well as histologists, have declared to present the typical characters of malignancy, have been repeatedly excised with the greatest success. The establishment of these facts will go far to prove the unpathological character of this distinction among morbid growths, and this is easily done by reference to a few of the many recorded cases which may now be confidently depended on as having been carefully observed.

Thus *Fibroma*, consisting of absolutely nothing but fibres, in all its forms has frequently returned after operation, so that it has received the name of *recurrent* (Syme, Paget), and it has also invaded every part of the economy. The dermoid variety has been shown by Mr. Paget, not only to return in the mamma after excision, but to infiltrate itself in the form of numerous distinct nodules throughout the lung.* Lebert† has recorded seven cases where *sarcoma* has spread to the neighbouring glands of the original growth, and to various internal organs, and Professor Smith of Dublin,‡ in a magnificently illustrated memoir, has published two cases in which neuroma occurred everywhere throughout the system. *Lipoma* may be general in the form of excessive obesity, but even when local frequently returns after extirpation.§ *Angionoma* may be so constitutional, that cases have been published in which aneurisms were present in almost every artery in the body.‖ As regards *cystoma*, I have frequently been struck in opening dead bodies with the frequency and universality of cystic formations in some of them. In one man I found innumerable sebaceous cysts scattered over the whole anterior surface of the thorax and abdomen. Where however the occasional constitutional nature of *cystoma* is demonstrated, is in cases of bronchocele and mollusca. *Adenoma* is eminently constitutional, being differently affected in a variety of general disorders, as plague, syphilis, scrofula, typhoid fever, etc. *Epithelioma* not only spreads to neighbouring glands, but has also been shown by Mr. Paget to infiltrate the lungs and heart, after operations for the removal of similar growths in distant organs.* *Enchondroma* has invaded numerous parts, and among others in the same case, the testicle and lungs.† *Osteoma*, composed of true bone (not cancer in bone), has, in a case by Mr. Swan, after affecting the femur, appeared secondarily in the pleura, lungs, omentum, and diaphragm.‡ Müller§ has also referred to such constitutional osseous tumours under the name of Osteoids. Of the constitutional characters of *carcinoma*, I need say nothing.

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* Surgical Pathology, vol. ii. p. 151, *et seq.*

† Traité d'Anatomie Pathologique, p. 194, *et seq.*

‡ A Treatise on Neuroma, Folio, Dublin, 1849.

§ Sedillot, Recherches sur le Cancer, 1849, obs. xxix.

‖ Cruveilhier. Livraison, 28. Scarpa. Tar. ix.

It follows that every kind of morbid growth may be malignant in whatever sense that term be employed, whether used to signify a growth incurable; recurring after the operation or primary lesion; as infiltrating neighbouring or distant tissues and organs, or as continuing its progress and destroying life in spite of all the resources of art.

On the other hand, it is easy to prove that all these forms of growth may either disappear spontaneously, or be cured successfully by operation, so that the individual has made a permanent recovery. With regard to carcinoma this has been denied by some and is doubted by many. On this subject I wrote in 1849 as follows, regarding the permanent recovery from cancer:—"Doubts must always exist, regarding such cases, so long as no authentic record is preserved of the minute examination of the tumour removed. Every experienced surgeon who adopts a favourable or unfavourable view of this question, can point to crowds of cases in support of his opinion; but when he is asked whether the growth operated upon be truly cancer or not, it will be found that there are no positive grounds on which to form a conclusion. He *considered* it to be cancer, nothing more. In the present state of our knowledge then, I believe that there is no possibility of pronouncing accurately whether an operation will be successful or not. It appears to me that all analogy opposes the doctrine of the necessarily fatal nature of cancer, or of any other morbid alteration of the economy. There was a time when phthisis pulmonalis was also thought to be necessarily fatal, and when recoveries from it led practitioners to doubt their diagnosis rather than the truth of a received dogma. Morbid anatomy has exploded that error, as it will doubtless do that, in regard to cancer."‖

Since then, M. Velpeau, in a work published in 1854, has proved the correctness of these statements, and shown that cases which not only presented all the characters of scirrhoma and encephaloma, but which were *proved* to be so by careful histological examination, have been successfully extirpated without returning. Some of these cases are truly remarkable, the disease having advanced apparently to its last stage and involved large masses of neighbouring glands, so that nothing could well be more desperate than operating under such circumstances. Notwithstanding, the parties have lived since the local extirpation of the disease up to this time, that is, from five to eight years, in perfect health.*

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* Opus. Cit. pp. 448, 449.

† Paget in Medico-Chir. Trans. vol. Fichte, Ueber das Enchondrom, p. 58.

‡ Lond. Pathological Trans. vol. vi. p. 317.

§ Archiv für Anatomie und Physiologie, 1843, t. v. pp. 396, 442.

‖ Cancerous and Cancroid Growths, p. 233.

While thus it is contended that there is no growth which may not be malignant, and none which may not be innocent, it is not denied that some have a greater tendency to spread and affect the system than others. In reference to treatment, therefore, it becomes of the greatest importance to determine the laws which apparently govern the propagation and multiplication of morbid growths, or the circumstances which render—say carcinoma and epithelioma—more susceptible of being communicated to neighbouring and internal organs, than purely fibrous or osseous ones.

There is one circumstance which has been overlooked by surgeons, viz., that certain growths abounding in cells have a great disposition to infiltrate themselves among muscles and neighbouring parts, and may be detected there by the microscope, although invisible to the naked eye. In the muscles of the tongue, below an epithelial ulcer, I found numerous granules and commencing cells, though it seemed healthy (Fig. 205); and in the sterno-mastoid muscle, covering a tumour of the parotid gland, clumps of nuclei were developed, and the fasciculi were converted into fibres. (Fig. 261). In this case the muscle looked pale and atrophied, but exhibited no appearance of being infiltrated with cancer.

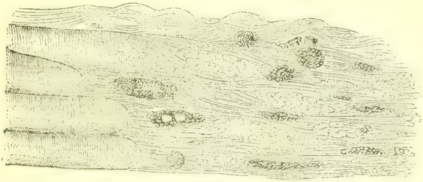

Fig. 261.

It follows that in many cases where the surgeon thinks he has removed a morbid growth, he really leaves multitudes of germs behind which continue to propagate the disease. Dr. Handyside removed the inferior extremity of a boy at the hip joint, in June 1843, for cancer of the femur. I carefully examined a small portion of one of the upper flaps, which was subsequently cut away, on observing a piece of the tumour attached to it. All the muscles were fatty and infiltrated with young cancer cells. (Fig. 262). In short, all the muscles which formed both flaps were already cancerous, and I told the operator that the disease would probably return in the stump. The incisions healed favourably; but in a few months cancerous nodules appeared not only in the cicatrix but in other places, and caused death.* I have also seen the same mode of propagation in nerves, as has been figured in muscles (Fig. 205, 261). I found the brachial nerve in connection with a cancerous tumour of the humerus, infiltrated with granular masses and granules, some of these latter arranged in rows, and meeting together, apparently to form nuclei of new cells, as in Fig. 263. Professor Van der Kolk of Utrecht has lately confirmed these observations, and also traced incipient cancer-cells among the tubes of neighbouring nerves.

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* Velpeau, Traité des Maladies du Sein, etc., 1854. M. Velpeau informed me last August (1856), that Madame H, the case recorded in his work, pp. 686, 687, was then living perfectly well after six returns of the disease

Fig. 261. Fibre of the sterno-mastoid muscle, in the neighbourhood of a cancerous growth, partly transformed into fibres, with masses of young cancer-cells. 250 *diam.*

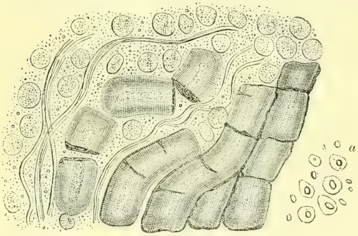

Fig. 262.

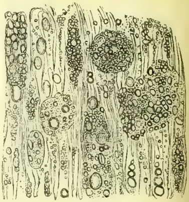

Fig. 263.

Hence one of the chief causes of propagation among growths, is that the cells in the process of development become infiltrated among neighbouring tissues. But how do they accomplish this? Van der Kolk suggests that the fluids which they contain mingle with the juice of the parenchymatous substance around them, and that in the latter there are deposited molecules and granules, which, having received from the former certain tendencies to evolution, are ultimately transformed into similar structures. This view is not only exceedingly ingenious but very probable, and will serve to explain how the blood and distant organs are secondarily affected. The notion of solid germs floating in the blood has no facts in its support, but the idea of a fluid secreted by cells being absorbed is consonant with every known law of nutrition.

The fluid, then, of a morbid growth, elaborated in the process of its development and the result of cell or other formation, would seem to be the most probable material whereby secondary growths are produced. We have seen that many tumours which have no cells, may be recurrent and attack tissues secondarily. Still they all contain a parenchymatous juice, and as a general rule those that are most soft and pulpy are most liable to return. I have recorded two singular examples of cancroid growths which returned and killed. In one of these, the tumour was removed from the breast by Mr. Page of Carlisle, and consisted of a pulpy fibrous substance, in various stages of development, and of granular cells. Six months afterwards a similar growth of like structure formed in both thighs, of which she died. (Figs. 264 to 266).

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* Cancerous and Cancroid Growths, p. 103.

Fig. 262. Fasciculi of muscle, forming the flap in an amputation of the thigh, already infiltrated with young cancer cells. *a*, The latter, after the addition of acetic acid.

Fig. 263. Granules, nuclei, and granular cells, infiltrated among the tubes of the brachial nerve, near a cancerous growth. 250 *diam.*

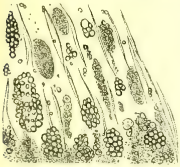
Fig. 264.

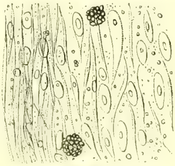
Fig. 265.

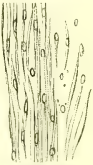
Fig. 266.

In another case the leg was amputated above the knee by Mr. Norman of Bath, for a fungoid tumour, below the gastrocnemii muscles. It consisted of fusiform corpuscles in different stages of development, mingled with naked nuclei, a multitude of molecules and granules, and a few blood globules, as represented in the figure. (Fig. 267). Two years later a similar tumour formed in the right chest, compressing the lung, of which she died.

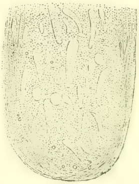
Fig. 267.

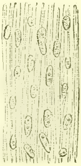
Fig. 268.

These, together with the cases of sarcoma, neuroma, enchondroma, and epithelioma referred to, show that constitutional tendencies do exist, for the reproduction of morbid growths, similar to those which have previously been formed. A recurrence of all diseases, and especially of apoplexy, epilepsy, rheumatism, bronchitis, etc., are equally common and appear to follow the same law. But the idea that *because* they do so they should be separated under the name of "malignant," appears to me unpathological. Multiplying the number of cancers seems equally faulty. We may just as correctly talk of a rheumatism being innocent or malignant, as apply those terms in different cases to fibrous, cartila-

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Fig. 264. Structure of the soft part of the tumour removed by Mr. Page of Carlisle.
Figs. 265 and 266. Structure of the more indurated parts.
Fig. 267. Structure of a fungoid growth of the leg, removed by Mr. Norman of Bath.
Fig. 268. The same, after the addition of acetic acid. 250 *diam.*

ginous, osseous, or other kinds of morbid growth, for no other reason than because sometimes they are local and at others more general.

Decline or Degeneration of Morbid Growths.—In their decline as in their development, the various kinds of morbid growths follow the laws which regulate degeneration of texture. Some, as lipoma and adenoma, have been known to be gradually absorbed and disappear. Others undergo the albuminous, fatty, mineral, or pigmentary transformations to be subsequently described. To enter into the peculiarities of each morbid growth in this respect would lead me too far. They will be referred to generally in the next lecture. All I need say here is, that every kind of morbid growth may degenerate and prove abortive in one way or another. Cancer especially has been known to slough out, and heal by cicatrix, besides having been checked in its development and rendered abortive in every known mode of retrograde transformation.

General Treatment of Morbid Growths.

The treatment of morbid growths may be divided into local and constitutional. The local treatment comprehends—1st, Means of retardation and resolution. 2d, Means of extirpation.

1. *Means of Retardation and Resolution.*—These consist in putting in force all those circumstances which are opposed to development of tissue, such as topical cold and graduated pressure, avoiding moist applications and local irritation. These means, as they are opposed to those circumstances which are known to favour cell growth in the animal and vegetable worlds, such as heat, moisture, stimulants, and room for expansion, might be expected to retard the progress of morbid growths. Dr. Moncrieff Arnot has in consequence found much benefit from the application of frigorific mixtures, and Dr. Niel Arnot has applied graduated pressure with occasional good effect. The difficulty of such treatment consists in the frequent impracticability of their application, as they can only be serviceable when the growth is external, and in certain places. Such treatment also is counteracted by the fact that although you freeze the parts externally, it is continually supplied with warm blood from within ; and although you compress outside, you only thereby run the risk of causing extension towards the interior. Both these means, however, which may be carried on conjointly, are eminently deserving further trial. As moisture favours, so dryness is opposed to growth, and the avoidance of local irritations, as they are a common exciting cause, is obviously indicated.

2. *Means of Extirpation.*—These are excision of the part, and the application of chemical agents which destroy texture.

From all we have said as to the origin, mode of development, and propagation of morbid growths, it would appear that they may all destroy life, and that those which exhibit the most rapid powers of spreading may supervene on the more indolent ones. Hence, as a general rule, so soon as it becomes evident that means of retardation and resolution have failed to arrest their progress, an operation should be had recourse to. If *early* excision were more practised, many of the lamentable cases which occur in practice would not arise. Even in advanced cases, it should never be neglected so long as the diseased parts are external and within the reach of the knife. We have also seen that surgeons in removing tumours, have left behind tissues infiltrated with cells capable of causing their regeneration. Hence the neighbouring textures should be carefully scrutinized, and all those portions of them infiltrated with cancerous germs carefully removed. For this purpose the microscope ought to be a necessary instrument in the operating theatre, and every suspected tissue in the neighbourhood examined by experienced histologists, before the lips of the wound are closed. This proceeding, which I recommended in 1849, has not, so far as I am aware, yet been practised by surgeons, but its propriety has been lately supported by Van der Kolk, and will yet, I believe, become the rule, when a knowledge of the pathology of morbid growths is better understood. The practice of M. Girouard of Chartres, who by caustic directed towards the neighbouring tissues of cancers, has sought to destroy the germs whereby they spread, and thus prevent return of the growth, is, in this point of view, highly encouraging.*

The application of chemical means, as various kinds of escharotics, to destroy local growth, have been extensively tried, but without as yet having enabled practitioners to arrive at any definite results. The great obstacle is the possibility of attacking the entire growth. In epithelioma, however, where it is external, this kind of practice appears more indicated, and is deserving of further trial.†

Constitutional Treatment.—We are altogether unacquainted with any means of counteracting the tendency which predisposes to morbid growths. But considering that for the most part the constitutional change is connected with excess of nutrition, and in this respect is altogether opposed to what we observe in cases of scrofula and tubercle, we may infer that lowering the nutritive processes, while we yet allow the general tissues to be supported, should be the rule of practice. In carcinoma, and rapidly formed growths, the body (unless it produce emaciation by attacking the chylopoietic viscera) is for the most part fatty, and a diminution of this element in our food should be aimed at. But at a later period, when exhaustion makes its appearance, nutrients and stimulants will be required to prolong life.

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* Archiv. Gen. de Med. tom. xcv. p. 739.

† See Langston Parker, on the Treatment of Cancerous Disease by Caustics. 1856.

MORBID DEGENERATIONS OF TEXTURE.

In the same manner, although from exactly opposite causes, that there may be hypertrophy or increase, so there may be atrophy or diminution of texture. It may be a simple decrease of bulk, the organ or tissue otherwise retaining its usual structure and function. There may be less work to do, and less force consequently required; and for the same reason that the legs of a dancer become larger, those of a bed-ridden individual become smaller. So also as there may be increased bulk with alteration of texture, so there may be diminished size with change of tissue. These latter, as they constitute true organic diseases, especially merit our attention; and they may be arranged in four groups, viz.—1st, albuminous; 2d, fatty; 3d, pigmentary; and 4th, mineral degenerations.

Albuminous Degeneration.

We have already seen how essential albumen is to nutrition; and that to be made assimilable in various forms to the tissues of the body, it must be subjected to certain processes. Under other circumstances it may be effused, or collect in particular parts of the system, constituting organic diseases. If transuded through the vessels in a fluid form, that is, dissolved in water, as we find it in the serum of the blood, it produces what is called dropsy. If precipitated from its solution in a solid form, it may constitute a variety of inorganizable deposits presenting various kinds of ultimate structure. Lastly, tissues composed of various proximate principles, may be wholly converted into an albuminous substance, and thereby have their vital properties impaired or lost. We shall notice these shortly in succession.

Albumen in solution is frequently effused from the blood-vessels as serum, constituting dropsy. It is distinguished from an exudation by containing no fibrin. There is not, therefore, that disposition to rapid coagulation and formation of an organizable blastema, although there is often a precipitation of matter, capable of assuming various forms. We have seen that an exudation depends on an alteration of the vital force which governs the attraction and selection of nutritive materials from the blood. Serous effusion or dropsy, on the other hand, is always indicative of mechanical obstruction to the return of blood from the capillaries through the veins. Thus, pressure of a tumour on the large venous trunks, disease of the heart and liver rendering the circulation difficult, or of the kidneys and skin diminishing the secretion or exhalation of fluid, are its most common accompaniments. In Bright's disease of the kidney, conjoined with various changes in the texture of the organ, serum containing albumen, passes off in the urine.

Membranous Albumen.— Albumen in solution, if it exist in tolerable quantity, is very apt to be precipitated in flakes or membranes. At the onset of vesicular diseases, as pemphigus, the fluid effused has been observed on being heated to contain smooth or folded laminæ.

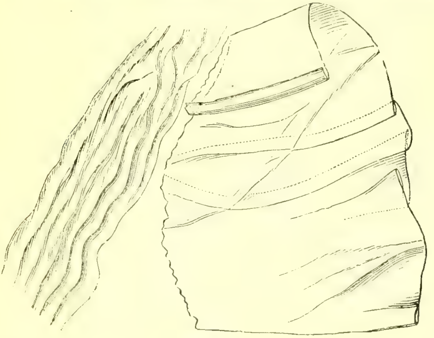

Fig. 269.

(Fig. 269). The same laminæ may be produced artificially by bringing oil or chloroform in contact with serum. Hence they are not fibrinous but albuminous. The mere shaking of white of egg, or manipulating serum in various ways, will often cause these laminæ to form and constitute shreds, which resemble fibres, but are truly membranous (Panum, Melsens). Sometimes such membranes, if produced slowly, collect round a central nucleus, and ultimately form a concretion. The same has been observed by Wedl in the scrotum, where the skin was converted into a tough substance like caoutchouc. (Fig. 270). The concentric laminæ which form in the interior of aneurisms present a similar structure, and are probably albuminous. (See Concretions).

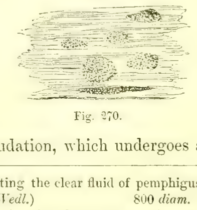

Fig. 270.

Fibroid Albumen.—Many tissues, especially fibrous ones, when exposed to a certain amount of pressure, become unusually dense. This may be the result of an exudation, which undergoes a

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g. 269. Structureless membrane formed by heating the clear fluid of pemphigus. On the left hand the membrane is folded together.—(*Wedl.*) 800 *diam.*

Fig. 270. Edges of albuminous laminæ, in a case of hydrocele, where the skin was destroyed. *a*, Edges of horizontal laminæ; *b*, the same in another place, with brownish-yellow pigment granules.—(*Wedl.*) 250 *diam.*

peculiar transformation, the whole becoming white in colour, hard and tough to the feel, and consists of dense fine fibrous texture. It may also be the result of a peculiar transformation, or fibrillation of pre-existing tissues, independent of exudation. It has been described by Dr. Handfield Jones under the name of *fibroid degeneration.* We find it in various situations—1st, In the areolar texture of the skin, producing peculiar indurations, as in the hide-bound integument of infants. 2d, On serous membranes, where it occasions opaque thickenings, as in the arachnoid, pleura, peritoneum, and pericardium. The white spots on the heart are of this character, and all of them have their probable origin in a chronic form of exudation, which is subsequently transformed into a white albuminous mass (Fig. 140). The thickened valves of the heart, and especially the rough indurated masses occupying their free margins, are also examples of this lesion. 3d, In mucous membranes the areolar tissue between the basement membrane and muscular coat, and even the non-voluntary muscular substance itself, is very liable to undergo thickening and induration. We have seen the stomach and bladders upwards of an inch thick from this cause. (Fig. 271.) 4th, In the areolar texture of

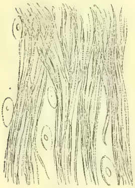

Fig. 271.

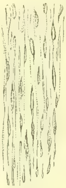

Fig. 272.

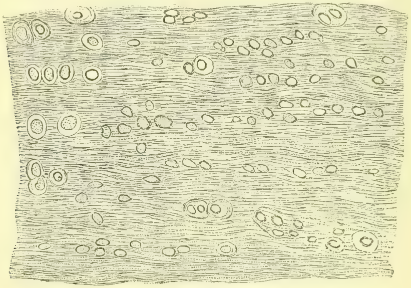

Fig. 273.

Fig. 271. Dense fibrous structure, with naked nuclei from thickened and indurated coats of the stomach.

Fig. 272. The same, after the addition of acetic acid.

Fig. 273. Splitting up into fibres of the hyaline substance of cartilage, in soft, velvety disease of an articular surface.—(*Redfern.*)

parenchymatous organs it constitutes the lesion which has been denominated cirrhosis, consisting of dense fibrous deposits, causing atrophy of the glandular substance, as in the liver, kidneys, lungs, etc. (See Cirrhosis.) Dr. Handfield Jones considers the white fibrous tumours of the uterus to belong to the same class of morbid alteration, which they do, together with similar formations in the placenta, spleen, and other organs. This form of degeneration gradually passes into, and may be identical with, fibrous growth as the result of exudation. 5th, The remarkable change which takes place in cartilage belongs to this head, as has been so ably described by Redfern. Under the influence of a stimulus, vital or mechanical, whilst the cells enlarge and their included nuclei multiply, the previously hyaline inter-cellular substance fibrillates and becomes transformed into bundles of fibres. (Figs. 273 and 240).

Celloid Albumen.—Cell-walls are generally of an albuminous character, but between them and the nucleus is for the most part a fluid, so that exchanges are constantly going on between the three essential portions of the cell, whereby its growth is kept up, and in many cases development carried on. It frequently happens, however, that even in formative fluids, albumen is thrown down in globular masses, so as to resemble cells. Thus, 1st, in pus, soft cancer, and other forms of morbid growth, there may frequently be seen diaphanous bodies floating about, of various sizes, of extreme delicacy, and perfectly globular in shape. Very commonly they are homogeneous and perfectly transparent, but sometimes they contain one or more bright refracting granules, and at others a cavity seems to have formed in the interior, but no nucleus. (Fig. 274.) 2d. Pus corpuscles (Fig. 40), and collections of blood globules may frequently be seen surrounded by a similar diaphanous coating more or less thick. In recent hæmorrhagic apoplexies in man I have seen collections of blood corpuscles, surrounded as if by a cell-wall, (Fig. 275), and Dr. Sanderson has produced them artificially in pigeons, by pricking the brain through the cranium with needles, and causing extravasation of blood. A few days after such an experiment, groups

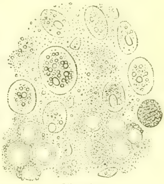
Fig. 274.

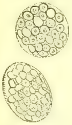
Fig. 275.

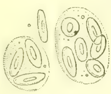
Fig. 276.

Fig. 274. Diaphanous albuminous bodies, with fatty cancer cells from the diaphragm.

Fig. 275. Groups of blood corpuscles from an apoplectic extravasation in the human brain, surrounded by an albuminous layer.

Fig. 276. A similar albuminous layer, round groups of blood-cells from the brain of a pigeon.

of oval corpuscles may be seen surrounded by a layer of albumen, often presenting a series of concentric rings.* (Fig. 276.) There can be no doubt that in these cases an albuminous precipitate is formed round the blood corpuscles, which now begin to break down and decay. 3d. Another form of celloid albumen may be seen in certain mechanical softenings of the brain and spinal cord, where the nerve tubes break up, unite at their edges, and form globules bounded by double lines. I have seen them produced under the microscope by mechanical pressure between glasses, in the manner represented in the figure. (Fig. 277.)

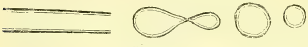
Fig. 277.

Molecular Albumen.—Some textures assume a peculiar kind of induration, which on examination is found to consist of molecular amorphous matter. 1. Induration of the brain consists of an albuminous molecular matter deposited among the tubes, rendering the thinnest sections opaque, and giving to the texture a peculiar toughness. It is common round chronic abscesses of that organ, and may have originated in exudation, which has been transformed into the substance described. 2. Certain peculiar yellow masses, found in the kidney and spleen, with abrupt margins of irregular outline, appear to me to constitute a degeneration of a similar character. 3. Certain forms of tubercle may be said to consist of the same amorphous, finely molecular albuminous substance.

Waxy Degeneration.—A peculiar change in the pre-existing texture of various organs, known under this appellation, sometimes called brawny or bacony, when applied to the liver and spleen, appears to me to be a form of albuminous degeneration. 1st, In the liver it presents to the naked eye a pale fawn colour, the tissue is of unusual density, and on section presents a smooth surface, with semi-transparent edges. The hepatic cells under the microscope are seen to be shrivelled, colourless, and of peculiar transparency, with the nucleus absent, or evidently disappearing. Fig. 278). 2d, In the kidneys the organ presents the same general aspect; and, on minute examination, the glandular cells are similarly affected to those in the liver, and not unfrequently the Malpighian bodies have evidently undergone the same alteration. (See Diseases of the Kidney.) 3d, In the spleen the same characters are presented, both to the naked eye and under the microscope, the cells of

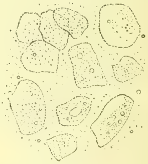
Fig. 278.

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* Monthly Journal of Medical Science, September and December 1851.

Fig. 277. Substance of nerve tube, by means of traction, broken across and forming two globules, with double outline.

Fig. 278. Cells of the liver, in waxy degeneration of that organ. 250 *diam.*

the parenchyma, as well as those in the Malpighian bodies, being compressed together, shrivelled, and presenting a similar pale, translucent appearance. 4th, I have seen the same transformation in the placenta as well as in chronic simple, cancerous, and tubercular exudations.

This lesion is not unfrequently associated with the fatty degeneration next to be spoken of, especially in the liver and kidney, when in a cirrhosed state. (See Fig. of Cirrhosis of Liver.) It would appear from analyses of the liver, collected by Dr. W. Gairdner*—mostly made by Dr. Drummond—that the human liver, when affected with the waxy degeneration, contains less water, a considerable deficiency in fat, and a marked increase of solid constituents.

Colloid Degeneration.—We have previously seen that there is a peculiar form of cancer called colloid, in which glue-like matter is associated with cancer cells. But colloid may occur independent of cancer, and may thus constitute the contents of certain cysts (see Cystoma). It would appear to vary in chemical composition, as I have observed that sometimes preparations of it coagulate into a solid mass, whilst at others they are unaffected by the action of spirits. If not identical, it is at least allied to the albuminous degeneration.

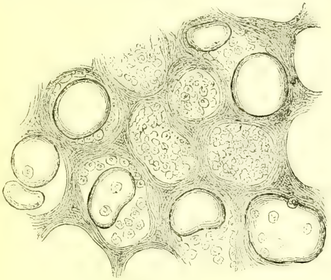

Fig. 279.

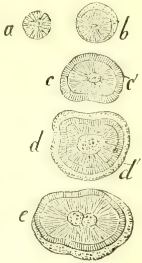

Fig. 280.

The enlargement of the thyroid gland in bronchocele, and the contents of compound ovarian cysts, are generally owing to the formation of colloid matter. (Fig. 279.) Not unfrequently masses of colloid matter become indurated, and assume a radiating striated appearance (Fig. 280).

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* Monthly Journal of Medical Science. May 1854.

Fig. 279. Section of the thyroid body, with some of its glandular sacs, distended with colloid matter.—(*Kölliker.*)

Fig. 280. Radiated colloid masses from a cyst in an atrophied kidney. *a*, Lines radiating from a central point; *b*, radiated mass surrounded with a clear border; *c*, radiated mass with a central granular substance and radiated border *c'*; *d*, the same with an external clear border; *e*, a mass with two granular globules in the centre.—(*Wedl.*) 250 *di.*

General Pathology and Treatment of the Albuminous Degeneration.

It has been previously pointed out that albumen is essential to nutrition, and that it forms the basis of the blood and of the tissues. The flesh which constitutes the food of carnivora, and the albumen which comprises so large a portion of the fodder of granivora, are alike, by the solvent action of the digestive juices, reduced to a fluid state. In this condition it passes into the blood, forming the walls of the blood-corpuscles, besides entering largely into the constitution of the liquor sanguinis, as serum, that is, albumen dissolved in water. During the building up process of the former it undergoes various transformations, among which those of its conversion into the fibrin of flesh, and the gelatine of bones, are perhaps the most important. By its association with the other proximate principles, also, it enters into the composition of every texture and organ in the body, and again joins the blood as albumen, mixed with a minute portion of effete matter as fibrin. There can be no doubt, as we shall subsequently see, that under certain circumstances it may be changed into fat, and the multitudinous transformations this important element is susceptible of making, well merits the term which, in its pure state, Mulder bestowed upon it, namely, that of "proteine."

As albumen, we have seen how it may produce abnormal conditions of the tissues, in various forms. The essential conditions for this kind of degeneration appears to be, 1st, extreme slowness of effusion from the blood-vessels, as in cases of chronic tubercle and fibroid transformation; and, 2dly, mechanical obstruction of the veins, in some part of the circulation, giving rise to dropsy. In the former case, it is favoured by excess of acidity in the primæ viæ, which, by its power of dissolving the albuminous compounds, must assist in adding this element to the blood in undue proportion. Why, on the other hand, muscles, cartilage, and the exudations, should sometimes pass into the albuminous fibroid degeneration, under pretty much the same circumstances that at others they become fatty, is a point in pathology which is still involved in the utmost obscurity.

The treatment will depend on the cause, nature, and seat of the degeneration, which in the living body are so obscure and deceptive as frequently to afford no indication for remedies. In the albuminous tubercular exudations, correcting excess of acidity in the stomach and bowels tends to check its excess, whilst the administration of animal oils favours its transformation into the nutritive molecular basis of the chyle. Wherever mechanical causes, or interruptions of the venous circulation, give rise to dropsy, recovery will depend on the means at our disposal for their removal.

Fatty Degeneration.

We have previously described fatty growths (see Lipoma), which, by encroaching on neighbouring tissues, and especially muscles, causes their atrophy. We have also seen how fatty matter accumulated within cysts, undergoes various transformations, both histological and chemical, now presenting a granular form, and then a crystalline one, composed of cholesterine or mangarine (see Cystoma). It is now ascertained that there is no kind of tissue, whether healthy or morbid, that may not undergo a fatty degeneration, and that such alteration frequently causes one of the most formidable organic diseases which the physician is called upon to treat.

Deposition of Fatty Molecules and Granules.—Fat is as necessary a constituent of the food and of the tissues as albumen, and its universal presence in the organs, texture, and fluids of the body, renders it easily capable of precipitation and accumulation, if in excess. The moment the smallest particle of oil is formed, and comes in contact with an albuminous fluid, a membranous precipitation of the latter takes place around it, which tends to keep the various fatty molecules distinct and separate from each other. No doubt, under the action of heat, trituration, pressure, or the action of acids, which dissolves the albuminous envelope, the molecules sometimes melt together, and constitute smaller or larger globules. The great predominance of the molecular form of fatty deposition, however, is evident in all morbid alterations of texture. In this state we find it constituting the substance of the atrophied supra-renal and thymus glands in the adult; the exudation in chronic softening of the brain, and other parenchymatous organs; accumulated within cysts, the result of transformation of their contents; in the centre of colloid masses; in chronic exudations, and extravasations of blood, presenting a milky, yellow, or fawn-coloured hue; or in the blood, urine, and other fluids, giving them a chylous character. Indeed, their presence may be said to be almost universal, and when collected together in masses, they constitute organic lesions of the greatest gravity.

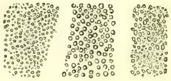
Fig. 281.

Fatty Degeneration of Cells.—It was shown by Reinhardt, that there was no kind of cell formation that did not, under certain circumstances, undergo the fatty degeneration. The manner in which this is accomplished is in all cases the same. A few fatty molecules first form between the nucleus and cell-wall. These increase in number, and some of them apparently melt together to produce larger ones. This process goes on until at length the whole contents of the cell consist of fatty molecules and granules. The nucleus is now no longer visible, and in many cases wastes away, as if from pressure. Occasionally,

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Fig. 281. Fatty molecules in groups, from the opalescent or white opaque centres of large colloid masses in the ovary. 250 *diam.*

this fatty deposition of molecules takes place within the nucleus in the first instance. (Fig. 85). In either case the cell-wall, distended by the accumulation of fatty particles, at length gives way, and the included oil granules either separate, or for a time adhere together in granular masses. Sometimes these bodies are easily ruptured by external violence; at others they are more resistant, and the oily matter is forced through the cell-wall, and collects outside, whilst the cell itself is more or less collapsed. In this way, collections of fatty granules and granular cells take place in the ducts of all glands which are lined by epithelium; in the air vesicles of the lung and in the bronchi; in the cells of the liver, causing fatty degeneration of that organ; in the shut sacs of vascular glands, as the spleen, and in all cell formations in exudation, especially those of pus and cancer.

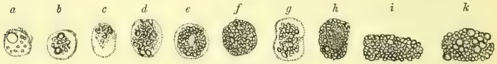

Fig. 282.

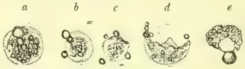

Fig. 283.

In stall-fed animals, a moderate accumulation of fatty granules in the interior of the hepatic cells is a normal condition, and the amount of fat in various tissues, which separates health from disease, is, under a variety of circumstances, impossible to determine with exactitude.

Fatty Degeneration of Muscle.—There can be no doubt that the fibro-albuminous substance constituting flesh is capable of undergoing a transformation into fat. Of the exact chemical nature of that transformation we have yet to be informed; but it may not only be observed in the dead body, but may be produced artificially, by exposing muscle to a running stream of water, whereby it is changed into adipocere. In voluntary muscle, we observe that the degeneration commences with diminished distinctness of the transverse striæ, especially at the circumference of the fasciculus. As this extends inwards, minute molecules of fat occupy the position of the striæ, and at length obliterate them; gradually these coalesce, globules of various sizes are formed within the sarcolemma, and the normal structure of voluntary

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Fig. 282. Granular corpuscles and masses from cerebral softening. *a*, Nucleated cell with a few granules; *b*, granules within the cell, partly obscuring the nucleus; *c*, granules over the nucleus; *d*, granules within the cell, no nucleus visible; *e*, cell nearly filled with granules; *f*, cell completely filled with granules; *g*, cell contracted in its middle; *h*, granular mass, the cell-wall having dissolved; *i* and *k*, granular masses peeled off from the vessels.

Fig. 283. Granular corpuscles acted upon by pressure. *a*, Some of the oily granules made to coalesce; *b*, oil forced through the cell-wall; *c*, the same with collapse of the cell-wall; *d*, rupture of the cell-wall; *e*, dislocation of the nucleus. 250 *diam.*

muscle disappears. During the early changes the fasciculus becomes soft, exhibits a tendency to crack crossways, and ultimately is so pulpy as to be capable of being squeezed easily into an amorphous mass, from which large oil drops exude. To the naked eye, the muscular substance becomes paler, and more and more fawn-coloured, and at length yellow, whilst its normal density is greatly diminished. These changes are easily observed in the heart, in which organ they have been made the subject of special research by Ormerod, Paget, Quain, and others. The histological and clinical researches of Dr. R. Quain* on this subject are of the greatest importance.

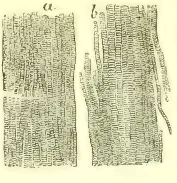

Fig. 284.

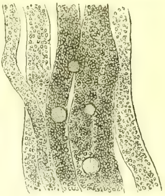

Fig. 285.

All the voluntary muscles, however, are susceptible of undergoing a similar lesion, and it may be not unfrequently seen in those of the lower extremity after long continued paralysis, disease of the hip joint,

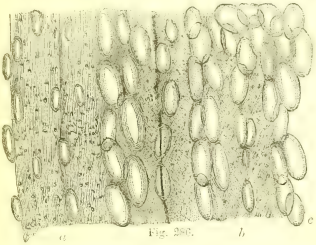

Fig. 286.

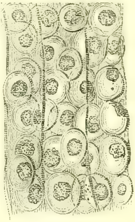

Fig. 287.

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* Med. Chir. Trans. vol. xxiii.

Fig. 284. Early stage of fatty degeneration of voluntary muscle. *a*, The muscle breaking across; *b*, the fibrillæ, easily separated. In both specimens the tissue is soft, although the transverse striæ are still visible.—(*Wedl.*)

Fig. 285. Advanced stage of fatty degeneration in the muscular fasciculi of the heart. The transverse striæ have disappeared, and the fasciculi are wholly composed of oil granules and globules more or less aggregated together.—(*Wedl.*)

Fig. 286. Fatty degeneration of the psoas magnus muscle of a lad, who died with morbus coxarius. *a*, Muscular fasciculi in which no traces of transverse striæ are perceivable. The longitudinal striæ are still not quite obliterated, although mingled with numerous fatty granules. *b*, Muscular fasciculi, wholly composed of minute molecules and granules, with no traces of either transverse or longitudinal striæ. *c*, Fat cells of various sizes running between and encroaching upon the fasciculi.

Fig. 287. Other fasciculi from another portion of the same muscle, after the addition of æther. The adipose cells have been made round and somewhat flaccid; the nucleus consists of a congeries of brownish granules. 250 *diam.*

or other lesions which necessitate immobility of the parts. In this case and occasionally in the heart itself, in addition to the transformation of the muscular fasciculi above described, adipose tissue accumulates between them, and by compressing their substance adds to the rapidity and completeness of the transformation. In such cases the muscles are of a pale yellow colour, yielding on section large quantities of oil, while they preserve their usual form and fibrous look. I have seen all the muscles of the lower extremities so affected. Occasionally, while some muscles exhibit this transformation in its last stage, others close beside them present their normal red colour, so that the limb on dissection resembles the alternate red and fatty streaks of bacon. In this case the degenerated muscle has the whole of its fasciculi transformed into adipose cells, with nuclei, as seen in Fig. 287.

In involuntary muscles fatty degeneration may also be observed, although it is by no means so common as in voluntary ones. In this case oily molecules are deposited in the elongated fusiform cells of which the texture is composed, which by their pressure on the nucleus cause its disappearance. Whether the distended pregnant uterus shrinks to its normal proportions after delivery wholly in consequence of such a degeneration (Heschl) is a point not yet determined in pathology. But there can be no doubt that many of the greatly enlarged fusiform cells of the organ (Fig. 134), do become more or less crowded with fatty granules (Fig. 288).

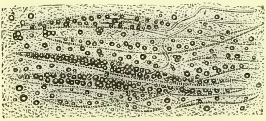

Fig. 288.

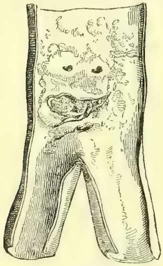

Fig. 289.

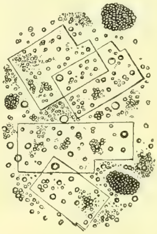

Fig. 290.

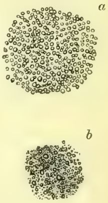

Fig. 291.

Fatty Degeneration of Blood-vessels.—The larger blood-vessels,

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Fig. 288. Enlarged fusiform cells of the pregnant uterus, after delivery, filled with fatty granules. 250 *diam.*

Fig. 289. Atheroma of a blood-vessel. *Natural size.*

Fig. 290. Fatty granules, oil drops and granule cells, with crystals of cholesterine from broken down atheroma of an artery.

Fig. 291. *a* and *b*. Two groups of fatty molecules from atheroma of artery. 250 *di.*

especially the arteries, are very commonly the seat of a fatty degeneration, generally called atheroma. It presents the appearance of a whitish or yellowish cheesy, but sometimes indurated and brittle substance, between the coats of the vessel, often protruding on its inner surface, and consists of numerous fatty granules, mingled with crystals of cholesterine (Gulliver), to which when hard and brittle are added calcareous amorphous salts. (Figs. 289 to 292).

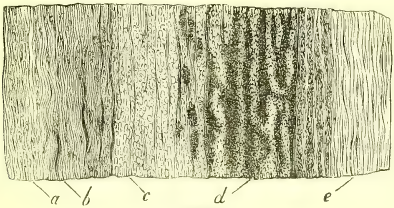

Fig. 292.

The smaller vessels and capillaries are frequently seen to be covered with patches of fatty granules, which vary in number from two or three, or even isolated ones here and there, to large masses of them which infiltrate the neighbouring tissue. The varieties in their appearance were carefully described and figured by me in 1842, * and attributed to exudations thrown out from the vessel. In 1849 Mr. Paget † also described the same facts, and attributed them to fatty degeneration of the vessels themselves. Now, without denying the occasional fatty transformation of the walls of minute vessels, and the accumulation of fatty molecules within the nuclei, it may readily be seen that for the most part the fatty granules are outside the vessels. Indeed, the extreme tenuity of the capillary wall does not permit of their formation in its substance, as it is much thinner than the granules themselves. Besides, it may frequently be observed that the large amount of fatty granules outside the vessels is enormously disproportioned to the bulk of the latter, and altogether inexplicable by supposing them to be formed in and given off by the vascular walls themselves, which for that purpose must assume a secretive function. I have also seen and figured cell-formations in every stage in the granular fatty matter, constituting softening of the brain. (See Fig. 106.) Of these, Mr. Paget wrote in 1853,‡—"Produced as they are in parts of the brain and cord in which no cell structures naturally exist (for they may

* Edin. Med. and Surg. Journal, vols. lviii. and lix.

† Medical Gazette.

‡ Surgical Pathology, vol. i. p. 146.

Fig. 292. Transverse section through the coats of the popliteal artery of an aged woman, who had gangrene of the feet. *a*, Inner coat; *b*, longitudinal fibre; *c*, circular fibres; *d*, fimbriated and elastic coats loaded with fatty granules; *e*, external areolar tissue.—(*Wedl.*) 200 *diam.*

be as abundant in the white substance as in the gray), we have yet, I believe, to trace the source and method of their formation." This admission appears to me altogether hostile to the idea of their originating in a degeneration of the vessels, whilst their formation in an exudation, as I have previously described it (p. 136), is consonant with every known fact. The true softening of the brain from deficiency of nutrition frequently exhibits altogether different structural changes, as I shall subsequently demonstrate. (See Diseases of the Nervous System).

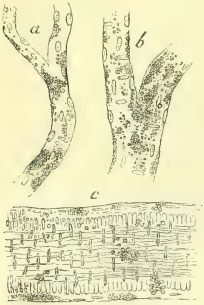

Fig. 293.

Fig. 293. Cerebral vessels of an aged individual who died of apoplexy. *a*, Ultimate capillaries; *b*, larger vessel; *c*, small artery, with fatty granules scattered over its surface.—(*Wedl.*)

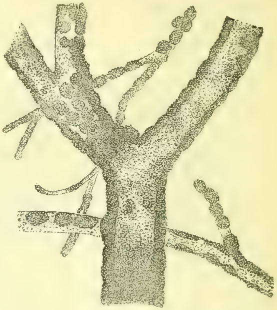

Fig. 294.

Fig. 294. Vessels from softening of the corpus strictum, coated with granules and granular masses.—(*Wedl.*) 250 *diam.*

Fatty Degeneration of the Placenta.—The lesion which has received this name from Dr. Barnes and others, was figured by me in 1844,[*] and likened to that which occurs in certain softenings of the brain. I still hold the same opinion with regard to it, and consider the fatty molecules and granule cells not to be formed by a transformation of placental tissue itself, but of the exudation or extravasation of blood which is poured out from its vessels. The yellowish or fawn coloured deposits may be infiltrated throughout the tissue of the placenta over a greater or less space, or they may occur in isolated spots forming nodules. They are generally somewhat indurated, and give rise to the idea that they are coagulated fibrin. I have frequently examined them and traced all the changes intermediate between a coagulated exudation or extravasation of blood, and the ultimate conversion of the foreign matter into a mass of molecules filling up the intervascular spaces. Similar observations have been more recently made by Drs. Handfield Jones[†]

[*] Treatise on Inflammation. Plate—Fig. 10.

[†] British and Foreign Med.-Chir. Rev., vol. ii. p. 354.

and Cowan.* In many cases the fatty material may be seen forming

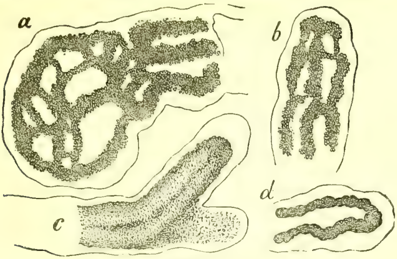

Fig. 295.

a layer separate from the vessel and inside the limitary membrane of the villus. In most cases, also, the texture of the placenta, though pale from compression, or shrunken, is intact, and the vessels, though coated externally with oil granules, are themselves quite healthy. Occasionally, in atrophied placenta, a quantity of brownish pigment is deposited

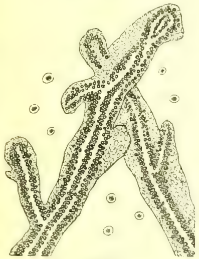

Fig. 296.

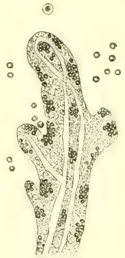

Fig. 297.

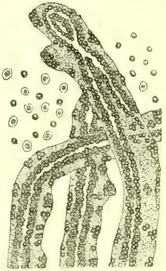

Fig. 298.

between the vascular wall and limitary membrane of the villus, which is probably owing to a modification of the fatty matter or of the colouring material of the blood. (Fig. 311, *a.*) (See Pigmentary Degeneration).

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* Edin. Med. and Surg. Journal, April 1854.

Fig. 295. Villi from the placenta of a six months' fœtus. *a* and *b*, The vessels coated with molecular fatty matter; *c*, exudation from the vessel, nearly occupying the whole substance of the villus; *d*, chronic exudation outside the vessel converted into brown pigment.—(*Wedl.*)

Fig. 296. Fatty granules coating the blood-vessels, within the placental villi.—(*Cowan.*)

Fig. 297. Groups of fatty granules scattered through the substance of a placental villus.—(*Cowan.*)

Fig. 298. Fatty granules both coating the vessels, and scattered through the villous substance.—(*Cowan.*) 250 *diam.*

Fatty Degeneration of Cartilage.—The cells of cartilage are liable to undergo the same fatty degeneration as are observable in other cells. The molecules at first formed, however, are exceedingly minute, thus communicating a brownish opaque aspect to the interior of the cell. (Fig. 299). Subsequently they coalesce and form larger granules, which again unite to produce drops of oil of considerable size. During this change the nucleus disappears, and sometimes the hyaline intercellular substance presents a multitude of brownish points, which communicate to it a marked opacity. (Fig. 310). At others it undergoes the fibroid transformation formerly described. (Figs. 240, 273).

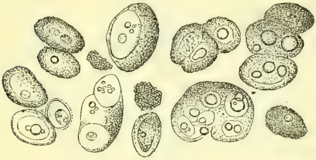


Fig. 299.

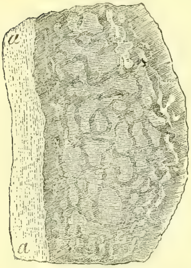
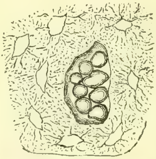


Fig. 300.

Fig. 301.


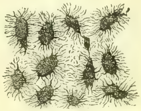


Fig. 302.

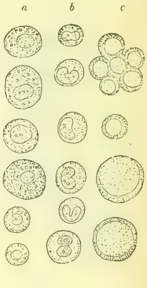


Fig. 303.

Fatty Degeneration of Bone.—Wedl has described the cancelli of

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Fig. 299. Cells in fatty tracheal cartilage. They are filled with fatty brown molecules, and the secondary cells contain oil globules.—(*Wedl.*)

Fig. 300. Horizontal section of the occipital bone in a case of syphilis. *a*, Dense external table, the internal composed of dilated cancelli filled with fat, seen by reflected light.—(*Wedl.*) 3 *diam.*

Fig. 301. Thin section of the same bone showing one of the cancelli enlarged and filled with fat globules, surrounded by empty lacunæ.—(*Wedl.*)

Fig. 302. Thin section of the outer table of the same bone.—(*Wedl.*)

Fig. 303. New cells formed in malacosteon. *a*, From the marrow of the femur; *b*, others with developing nuclei; *c*, from a rib in another case, in which some organs were cancerous.—(*Wedl.*) 250 *diam.*

bone in syphilitic caries as being dilated and filled with fat, owing to the exudation poured into them having undergone the fatty degeneration (Fig. 302), and in most cases of ulcerated bone a large formation of oily molecules and loose globules of oil may frequently be observed. Virchow has detected similar molecules in the lacunæ and canaliculi. The mollities ossium, or malacosteon of adults, is also a form of fatty degeneration of bones (Paget), in which the cancelli are loaded with large oil drops, often tinted red, combined with the formation of numerous cells varying in size from the $\frac{1}{1200}$th to the $\frac{1}{500}$th of an inch in diameter, containing a round nucleus, also varying much in size, occasionally showing various stages of division and of endogenous development. (Fig. 303.) This, like so many other of the so-called fatty degenerations of texture, is probably owing to an exudation from the blood-vessels, mingled with more or less extravasation of the coloured corpuscles, in which we find new cells developed, combined with fatty transformations of the albuminous and fibrinous materials. In this respect it differs from the softening of bone in rachitis, which may be regarded as arrested development of bone, with increased growth of cartilage cells. (Kölliker).

Fatty Degeneration of other Textures.—It would occupy too much space for us to describe, or even particularise every tissue that is now known to undergo a fatty degeneration. All the glands may undergo this change. Nervous texture may soften, break up, its fatty material be liberated, and accumulate in oil drops of greater or less size. In emphysema, the pulmonary texture is sometimes fatty. (Rainey.) The cornea (Canton), and the lens (Dalrymple, Lebert), also may be similarly affected, forming soft cataract. Indeed, under various circumstances, it may be said that there is no organ or textures of the body, which in some form or other may not undergo this degeneration.

Fatty Degeneration of the Exudations.—We have already seen that what has often been called fatty transformation of tissue, is, in fact, this change occurring in the constituents of the blood, which have been exuded or extravasated. *Simple exudation* is constantly undergoing fatty degeneration. I have seen the false membrane of pleurisy converted into a creamy substance, composed of innumerable fatty molecules, granular masses, and granule cells. Pus cells may frequently be observed to contain fatty granules, and to present all the intermediate stages of conversion into the granule cell, and the same may be observed in the pus and fibre cells of granulating sores. In *Cancerous exudation*, the fatty degeneration is so common, as to have attracted peculiar attention, under the name of "Reticulum." This occurs in two forms. In one it is seen on a fresh cut surface, scattered throughout the growth to a greater or less extent, as a network, more thick and abundant, however, in some places than in others. In the other it exists in masses of a bright yellow or orange colour; sometimes closely resembling tubercle, for which it has often been mistaken.

In the first form, granule cells, loose oil granules more or less mingled with decayed and broken down cancer-cells, are common. In the second, irregular bodies, resembling tubercle corpuscles, resulting from alteration in the form of the nucleus, after the cell-wall has been broken down, are numerous. (Fig. 307). In some retrograde cancers I have seen large portions of the growth entirely composed of such corpuscles, and not unfrequently these, as well as cancer cells in all stages of decay, are associated with crystals of cholesterine or margarine. (Figs. 304, 305.) *Tubercular* exudation may always be observed to contain a greater or less number of fatty granules embedded in it, as well as contained in the tubercle corpuscles. What is called the softening of tubercle is owing to an increase of these, by the gradual transformation of this albuminous form of exudation into fatty molecules, whereby the whole is rendered soft and pulpy. (See Fig. 126.)

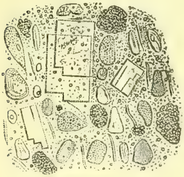


Fig. 304.

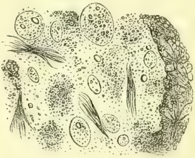
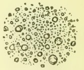


Fig. 305.

Fig. 306.



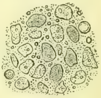


Fig. 307.

Fatty Degeneration of Morbid Growths.—All these are susceptible of becoming fatty, and thereby being rendered soft and pultaceous, but the manner in which this is accomplished is exactly similar to what we have described as occurring in the tissues of which they are composed, or of the exudations which are conjoined with them.

General Pathology and Treatment of Fatty Degeneration.

The causes of fatty degeneration are to be sought in all those circumstances which, while they weaken the vital action of a part, do not interfere materially with the assimilation of hydro-carburets. Yet the disease is not purely local, as it may frequently be observed that the kidneys, liver, heart, and other textures are prone to undergo the

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Fig. 304. Retrograde cancer-cells, granules and granular masses, with crystals of cholesterine, from the reticulum of cancer of a lymphatic gland.

Fig. 305. Fatty and broken down cancer-cells, with crystals of margarine, from the reticulum of cancer of the liver.

Fig. 306. Fatty granular matter from the softened reticulum of a cancer of the breast.

Fig. 307. Liberated and altered nuclei, with fatty molecules from the reticulum of a cancer of the testicle. 250 *diam.*

fatty change in the same person. Hence everything that increases fatty matter in the blood, such as its introduction by means of assimilation, or its not passing off in consequence of diminished excretion, tends to its production. Thus indulgence in rich food, and alcoholic liquors abounding in carbon, especially if there be little exercise, occasion it. Whether the fatty matter be deposited directly from the blood, or whether it be the subsequent result of a chemical transformation of tissue or exudation, has excited great discussion. Dr. Quain supports the latter view, and has performed experiments, whereby it would seem that healthy muscular fibrin may be rendered fatty artificially, by digesting it for a fortnight in water. I have repeatedly seen muscles and bones converted into adipocere, during the maceration in water necessary to clean the latter, and frequently examined the former during the process, so as to satisfy myself that the fibrinous material of flesh undergoes a chemical transformation into fat. I believe with Quain that the same thing occurs in the living body, not only when dead tissues are enclosed in it, as in the experiments of Wagner, but slowly in living texture, until its vigour is at length so impaired that it is incapable of performing its function. This view in no way excludes the probability that in certain cases fatty matter may transude occasionally through the vessels in a fluid state, and collect outside, or be infiltrated to a certain extent among neighbouring textures in a molecular form. Further, we have seen that it may occur within cells as a secretion; and by its accumulation not only may cause atrophy of the nucleus, but obstruction of tubes and an endless variety of organic and functional derangement in the economy, according to the extent and seat of the degeneration.

The treatment of this lesion is a field of inquiry which as yet has scarcely been entered upon. In most cases, indeed, its diagnosis in the living subject is very uncertain. But the cultivation of histology, by gradually informing us concerning those degenerations which are essentially fatty, and enabling physicians to recognize them as the cause of symptoms with which he has been long familiar, will assuredly at no distant day lead to more correct principles of practice. Already we begin to see indications of this in our notions regarding Bright's disease, and in the results of organic chemistry applied to clinical medicine. At present it would be premature to speculate on this subject, and what little there is to be said will be found under the head of special diseases.

Pigmentary Degeneration.

The formation of pigment in plants and animals is essentially connected with that of fat, most colours either being different kinds of tinted oil, or secreted in cells at the expense of carbonaceous products, which are readily transformed into fatty compounds. In morbid conditions we find several of the textures of different tints, but more especially red, yellow, brown, green, or black, from chemical alteration in the colouring-matter of blood or bile. Sometimes it is the result of peculiar secretions; at others, of the deposition of carbon.

Red Pigments.—All red coloration in the human body is owing to the presence of blood, the colouring principle of which has been called *hematine.* When observed in an isolated blood corpuscle, in which it is secreted, the real colour is seen by transmitted light to be yellow, although, as occurs with a strong infusion or tincture of saffron, it looks red to the naked eye when concentrated. Unless, however, it were known that the real colour of the blood were yellow, it would be impossible to understand the presence of this latter tint around ecchymotic spots, and in other situations. Virchow first described in extravasations of blood prismatic crystals, with rhomboidal bases, often approaching a needle shape, of a yellowish or deep ruby colour, which he denominated *hematoidine.* They are most frequently found in the sanguineous extravasations of the brain, in the corpora lutea of the ovaries, and in somewhat chronic hæmorrhages of the liver, of hydatid cysts, and of other textures, but rarely in pulmonary or cancerous extravasations. In size, they vary from the $\frac{1}{3000}$th to the $\frac{1}{500}$th of an inch in their long diameter. (Fig. 308). They are transparent,and strongly refractive, insoluble in alcohol, æther, dilute-mineral acids and alkalies. Concentrated mineral acids causes them to assume the shades of green, blue, rose-tint, and finally a dirty yellow.

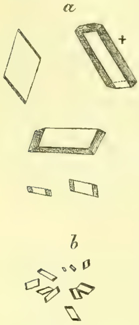

Fig. 308.

Yellow Pigment.—As the real colour of the blood is yellow, so is the liquor sanguinis in which they are dissolved, and consequently all recent exudations of lymph, as well as most kinds of pus and tubercle. Blood, after being extravasated, is broken down and absorbed; and as the colouring matter becomes less intense, it generally assumes a yellow coloration, as around ecchymotic spots, and old extravasations. Hence, also, the colour of the corpora lutea, and the yellow softenings of the brain, as well as the deep orange tint occasionally observed as the result of hæmorrhages. The adipose texture, as well as the morbid accumulations of fatty matter, assume a yellow tint, as when muscle undergoes the fatty degeneration, and the reticulum previously described forms in cancer.

There is, however, another source of this colour, in the bile. This is a deep yellow pigment, which, when absorbed into the blood, tinges all the textures, and passes off in large quantities by the skin and

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Fig. 308. Crystals of hematoidine. *a,* Large oblique rhombic prisms; at +, oblique six-sided prism; *b,* smaller forms.—(*Wedl.*) 250 *diam.*

kidneys. In the urine, when considerable in quantity, it resembles the colour of porter to the naked eye. When bile, diluted with water, is treated with nitric acid, a marked series of changes in colour ensue. A little acid renders it green, a larger quantity blue, purple, violet, and lastly, a dull red or brown yellow. These changes are supposed to be owing to the existence of three colouring matters in the bile, one brown, the *cholepyrrin*, another yellow, the *bilifulvin*, both discovered by Berzelius, a third the *biliphæin* of Simon. Whether these pigments are derived from, or converted into hematine, has not yet been ascertained, though suspected by Virchow, from the similar changes produced in crystals of hematoidine by the action of acids.

Brown Pigments.—During the decomposition of extravasated blood it has often been observed that the tints it sometimes presents are of a reddish, and sometimes of a bistre brown. Bile, also, when in mass, and inspissated, often assumes this colour. Different ganglia scattered through the nervous system owe their colour to the formation of brown pigment molecules which are deposited in the nerve cells. The skin, in some races, is naturally brown or swarthy; the areolæ round the nipples assume this tint during pregnancy; exposure to the sun induces this coloration of the skin, and causes freckles, and often large brown patches to appear on it in the fairest women; many warts and nævi are also of this colour. In all these cases it may be shown to arise from the deposition of a brown molecular pigment, in the deeper cells of the epidermis, and sometimes, as in warty nævi, from accumulation of dark pigment in minute sacs. (Fig. 309).

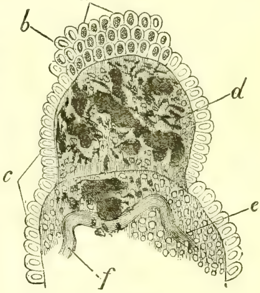

Fig. 309.

Dr. Addison has recently described a form of anæmia, in which the skin assumes a peculiar coloration, in connection with a diseased condition of the supra-renal capsules. It presents "a dingy or smoky appearance, or various tints or shades of deep amber or chestnut colour; and in one instance the skin was so universally and so deeply darkened, that, but for the features, the patient might have been

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Fig. 309. Wartlike brown *nævus maternus* of the female mamma. *a*, Epidermic cells, with their nuclei concealed by a dark brown pigment; *b*, the nuclei surrounded with similar pigment; *c*, cells without pigment; *d*, reddish-brown pigment, in the substance of an hypertrophied papilla; *e*, nuclei in fibrous texture; *f*, vascular loop.—(*Wedl.*) 250 *diam.*

mistaken for a mulatto."* Eleven cases have been published by Dr. Addison, and several others subsequently by Mr. Hutchison,† where, co-incident with more or less of this bronzing of the skin, the supra-renal capsules were indurated, cancerous, or otherwise diseased. Of the presumed connection between the functions of these glands, and the secretion of pigment in the integuments, it would be imprudent to speak without a far more extended knowledge of facts. The supra-renal capsules hitherto, have not been much investigated by morbid anatomists. Doubtless the memoir of Dr. Addison will direct their attention to them, so that ere long the fact of this connection will be extensively confirmed or nullified. Hitherto few opportunities have occurred of doing so.

Not unfrequently brown pigment may be observed collected within cartilage cells, when that texture is diseased in the neighbourhood of necrosed bone, or in death of cartilage itself. (Fig. 310). Occasionally, also, it is found covering placental villi, or situated between the vessel and limitary membrane of the tuft, evidently the result of changes occurring in extravasated blood. (Fig. 311).

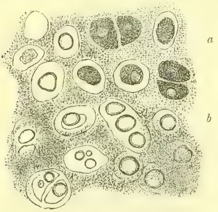

Fig. 310.

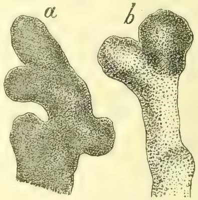

Fig. 311.

Green Pigment.—The cause of green pigment has not yet been determined. We have seen that nitric acid produces a grass green colour when added to bile, and it is possible that the addition of some acid matter to hematine in certain states of combination may produce a similar result. Abscesses of the brain not unfrequently contain pus of a decided green colour, and vomited matters occasionally present

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* On the constitutional and local effects of disease of the supra-renal capsules. 1855.

† Medical Times and Gazette.

Fig. 310. Atrophied bronchial cartilage, with deposition of brown pigment. *a*, Cells containing brown granular pigments; *b*, cells containing large fat globules; *c*, secondary cells with fatty granules. The inter-cellular substance is loaded with and obscured by brown pigment granules.—(*Wedl.*)

Fig. 311. Placental villi, containing brown pigment from an aborted fœtus, 18 inches long. *a*, Villus, at its termination loaded with brown pigment; *b*, one only partially so filled at its summit, but with molecular pigment scattered through its substance.—(*Wedl.*) 250 *diam.*

the same hue. The fœces in young children are sometimes of a spinach green, by some supposed to be an altered condition of bile, by others of blood. The contents of cysts frequently contain fluid of different shades of green. In mortification and putrefaction after death, the integuments frequently assume a greenish hue. Lastly, morbid growths, especially in the bones of the cranium, have been described and figured of a decided green colour (*Chloroma*) by Balfour,* King,† and Lebert.‡

Black Pigment.—Black pigment is far the most common degeneration met with as regards colour, and is found in various situations. Thus ecchymotic extravasations generally assume a dark purple or black colour. Vomitings of blood in yellow fever and gastric cancer are frequently dark brown or black, as are the fœces after blood has been poured into them, or after taking ferruginous medicines—(*Melæna*); certain softenings of the stomach itself, of the intestinal glands, and of the entire mucous membrane in cases of dysentery; the contents of ovarian cysts and other encysted tumours; intestinal and ovarian cicatrices; the sordes on the teeth and gums in cases of fever; and mortified or dead parts. When morbid growths are black they have received the name of *Melanoma*, and the black coloration of the collier's lung and bronchial glands has been called *False Melanosis* or *Black Phthisis*. Nothing is more common than to see chronic tubercle surrounded by black pigmentary deposit. Scattered tubercles on the peritoneum are often surrounded by a black ring, which, when magnified, presents the appearance represented. (Fig. 312.)

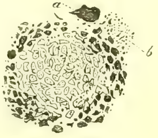

Fig. 312.

Black patches have occasionally been produced on the skin, apparently from the secretion of pigmentary matter on the surface, which is capable of being washed off. A case of this kind is recorded by Mr. Teevan,§ in the person of a young girl, aged 15, the upper part of whose face was covered with a black discoloration. The colouring matter was analysed by Dr. Rees, who found in it carbon, associated under the microscope with short hairs, epithelial scales, and granules and globules of fat.

Portions of necrosed bone are often of a black colour, a change which according to Wedl commences at the external portion of the systems of bone corpuscles, disposed round the Haversian canals. It is probably

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* Edin. Med. and Surg. Journal, vol. xliii. p. 319.

† Monthly Journal of Medical Science. Aug. 1853.

‡ Anatomie Pathologique, Planche xlv.

§ London Medico-Chir. Transactions, vol. 28.

Fig. 312. Ring of black pigment masses (*a*), and molecules (*b*) round a tubercle of the peritoneum. The black tint disappeared after some days immersion in alcohol. 250 *di.*

owing to a chemical change of the osseous texture, similar to what occurs in caries of teeth from the action of acid saliva. It is not dependent on an exudation, which in sections of a bone so affected is nowhere visible. (Fig. 313.)

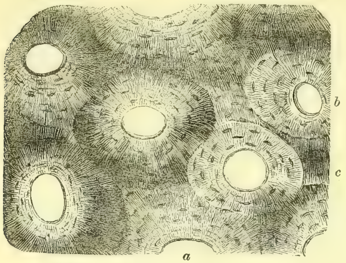

Fig. 313.

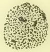

Fig. 314.

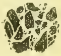

Fig. 315.

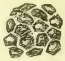

Fig. 316.

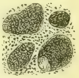

Fig. 317.

Black pigment may exist in the form of minute granules (Fig. 314), or irregular masses scattered throughout a texture. (Fig. 315). Sometimes the former are found within cells which vary in shape. (Figs. 316, 318). They may be round, flattened, many-sided, or have irregular prolongations. This occurs in the choroid membrane of the eye; in the skin of men and animals during health; in the melanotic growths so common in grey horses, (Fig. 317), in the epithelial cells of the collier's lung, and in certain forms of cancer. (Figs. 318, 319.) In all these cases the nucleus is sometimes clear and colourless, at other times obscured by the black pigment. Black pigment may also occur in the crystalline form, associated with hematoidine, in old sanguineous extravasations. These have been called *Melanin.*

It may be easily shown that the black pigment granules, cells, and crystals found in morbid products, although they may closely resemble each other to the naked eye, and even under the microscope, are of different chemical compositions. Thus one kind lose their colour on the addition of nitro-muriatic acid, or chlorine water, whilst another not only resist these agents, but even the action of the blowpipe. It follows that the latter consist of carbon, while the former

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Fig. 313. Transverse section of a necrosed tibia. *a*, Medullary canals divided transversely; *b*, pigment, formed at the junctions of the concentric bone systems; *c*, radiating bone canaliculi.—(*Wedl.*) 90 *diam.*

Fig. 314. Black pigment molecules from the lung.

Fig. 315. Black pigment irregular masses semi-crystalline, from an intestinal aggregate gland.

Fig. 316. Polygonal cells loaded with pigment, from the surface of the pericardium.

Fig. 317. Cells loaded with pigment, having clear nuclei, from a melanotic tumour of the horse. 250 *diam.*

are a peculiar secretion formed within cells, or a transformation of the colouring matter of the blood.

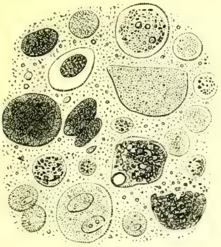

Fig. 318.

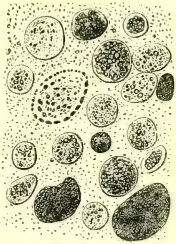

Fig. 319.

Blue, purple, and other pigments. — Blue pigment has been described as occasionally occurring in urine, but is so rare as to be almost unknown. The shades of purple and other intermediate tints may also sometimes be present, and are evidently owing to greater or less intensity or mixture of the different colours formerly described.

General Pathology and Treatment of Pigmentary Degeneration.

The formation and modifications of pigment as observed in plants and animals, is a subject which has been little studied, and opens up a wide field of inquiry for the chemical histologist. But in endeavouring to ascertain the causes which give rise to change of colour in the textures, we may attend to the following circumstances:—

1st. Colouring matter bears a certain relation to the non-nitrogenous and oily constituents both in plants and animals. Thus vegetable oils and resins are seen to form where starch or chlorophyle is collected, and these substances disappear in the cells, as the quantity of oil in them increases. In animals we almost always find pigment associated with fat. The brilliant colours of the invertebrata are so many coloured fats, and the pink fat of the salmon, and green fat of the turtle, indicate the same relation in animals higher in the scale. The epidermic appendages which are generally coloured, are always covered with fat, secreted by a special apparatus—the sebaceous glands. The blood corpuscles are intimately associated with the chyle, which is an oily emulsion, and the bile is rich in fat. In diseased conditions of the liver, the hepatic cells often contain oil to the exclusion of the yellow pigment. The supra-renal capsules

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Fig. 318. Cells in a melanotic cancer of the cheek, the black pigment in which disappeared on the addition of hydrochloric acid.

Fig. 319. Cells in the black sputum of the collier, the pigment in which is persistent under the action of every known chemical agent. 250 *diam.*

of man are brownish-yellow collections of oil granules, and should the observations of Dr. Addison as to the relation of these glands with bronzing of the skin be confirmed, it may ultimately be found to depend on the attempt to eliminate such fatty matter by the skin.

2d. It would appear that light, heat, and exposure to atmospheric air are connected with the production of pigment. The young leaves of plants are much lighter than those which are older, and the hair of young animals is not so dark as that of the adult. In autumn the leaves fade and become brown, reddish, or yellow, and in man we observe that the pigment of the hair ceases to be formed in advanced age, which at length becomes white. Young fruit is green, and as it ripens, the part exposed to the sun is most coloured. Exposure of the skin of man, as is well known, renders it darker, and the fairest skinned individuals (whose integuments are well loaded with fat) are those who are most subject to freckles. Then it must be remembered, that while light evolves colour in living, it destroys pigment in dead textures.

Now the decomposition of the atmosphere is carried on in vegetables by the leaves, under the stimulus of light, and in animals by the lungs and skin. In plants the leaves fix the carbon and give off the oxygen; in animals the lungs receive oxygen, while carbon is separated in the form of carbonic acid by the same organs, and oxygen in combination with water, in the form of exhalation, is given off both by the lungs and skin. That the skin is connected with respiration is proved by the fact, that if its functions are interrupted, pulmonary diseases and even asphyxia are the common results. Carbon is also separated in the form of oily matter largely by the skin and by the liver, an organ also connected with respiration. Hence why Europeans in tropical climates by breathing a rare atmosphere, eating well, and taking little exercise, are liable to hepatic diseases. Thus the lungs, skin, and liver are intimately associated, in the function of excreting carbon, and it is curious that these are the three organs in which pigment is formed. The blood must be brought to the lungs to receive fresh oxygen and give off its carbonic acid, and it is there the white corpuscles of the chyle become coloured, while the blood itself is rendered bright scarlet. On the other hand, the accumulation of carbonic acid in the capillaries communicates the darker tint characteristic of venous blood.

3d. There seems to be a certain connection between the materials introduced into the structure of the plant or animal by means of the soil and of food. Some plants are rich in acids, others in alkalies, or various salts originally derived from the soil, and we have seen that these re-agents operate on colouring matter. Although this subject has been very slightly investigated, we can still perceive how, by the evolution of chemical products, acting on different pigments, the various shades of colour may be occasioned, which we observe in most plants and some animals at certain seasons. Thus green chlorophyle may be changed in one place into a yellow resin, and in another, by the formation of ulmic or other acids, be transformed reddish or brown. In animals the influence of nutrition is traced with more difficulty but even here we may discern that at certain seasons (such as that of breeding) new products are evolved, which, by operating on the blood or the vital properties of cells, may eliminate more or less colour. According to Heusinger, carbonaceous food used in excess, tends to the production of pigment, and hence he explains how the Greenlanders, notwithstanding the cold, are dark coloured, from their constant consumption of fat.

For the pathology of carbonaceous deposit in the lungs of the collier, I must refer to the special diseases of the respiratory system. (See Carbonaceous Lungs).

The treatment of pigmentary degenerations is most uncertain, but if the preceding observations are in any way well founded, it must be clear that the management of this lesion must be directed to removing the physiological conditions on which it depends.

Mineral Degeneration.

By this term is understood the infiltration or deposition of mineral matter into a texture, in such a way that it is no longer capable of performing its functions. We have already seen that sometimes this takes place in such a regular manner, as to form bone, which replaces the pre-existing texture, as in muscle, membrane, or certain exudations and tumours. But at others it enters into the constitution of a texture dissolved in fluid, and is thus deposited in or throughout its substance, changing its physical and destroying its vital characters. In this way we separate mineral degenerations from concretions, which are accidental collections in hollow viscera, although undoubtedly they insensibly pass into one another. There is scarcely perhaps any tissue, whether elementary or compound, that may not undergo the mineral degeneration. But it is frequently observed in the coats of blood-vessels more or less associated with atheroma; in exudations; in certain morbid growths—rarely in nervous texture.

Mineral Degeneration of Blood-vessels.—Nothing is more common than to find the large arteries brittle from the deposit of mineral matter in their coats, often associated with fatty degeneration or atheroma; sometimes the one lesion and sometimes the other having the predominance. Plates and patches of mineral matter may in this way often be observed, which on stripping off the internal membrane (Fig. 320, *a*) may be seen embedded in the middle coat, *b*. These never present the structure of bone, but either an amorphous conglomeration of mineral matter, or an amalgamation of round globules, similar to those which Czermak has described as sometimes occurring in dentine (Fig. 320, *c*.) Occasionally, though more rarely, the smaller vessels undergo a similar degeneration. In this case mineral matter is deposited in their coats, which when widely scattered also presents a globular form, closely resembling drops of oil, for which they are apt to be mistaken, unless mineral acids are added, when they dissolve with effervescence.

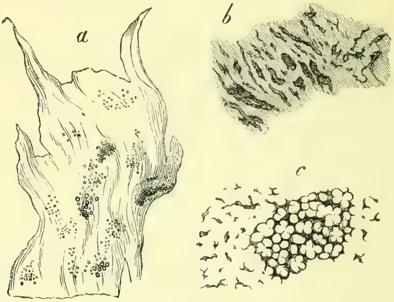

Fig. 320.

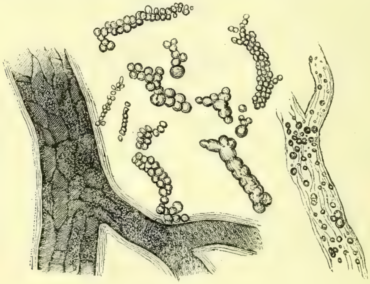

Fig. 321.

Fig. 317, represents this degeneration in the small vessels of the brain, as described by Dr. Bristowe and Mr. Rainey.*

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* London Pathological Transactions, vol. iv. p. 118.

Fig. 320. Structure of mineral degeneration of the walls of an aneurism. *a*, The internal membrane with groups of fatty granules; *b*, horizontal section of the cretaceous middle coats, presenting irregular spaces, of various dimensions, filled with carbonate of lime; *c*, globular masses of mineral matter, in the lighter portions of the section *b*.—(*Wedl.*)

Fig. 321. Incrustation of the small vessels of the brain, with carbonate and phosphate of lime, in the form of globules, some masses of which are separated, whilst others are aggregated together outside the vascular wall.—(*Bristowe and Rainey.*) 250 *diam.*

Mineral Degeneration of Nervous Texture.—Deposition of mineral matter in the tubes or ganglionic cells of nervous substance, is a rare occurrence in man, although more common in sheep and other of the inferior animals. Foerster, however, has recorded the case of a boy who had paralysis of the lower extremities, and in whose spinal cord after death, the nerve-cells and tubes were found encrusted with mineral deposits, as seen in Fig. 322. In this case, also, the cretaceous closely resembled fatty matter; but on the addition of hydrochloric acid, the granules were dissolved with effervescence.*

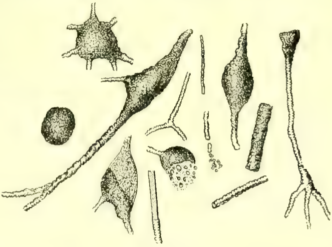

Fig. 322.

In other Textures mineral matter may be deposited occasionally in their interstices, but if, as in muscular tissue, it does not assume the form of a bony growth to which we have previously alluded (p. 204), it is usually the result of an exudation. The fibrous membranes of the brain not unfrequently in this way contain calcareous laminated depositions. In certain parts of the pia mater, and the choroid plexus especially, we often find mineral bodies of a round or oval form resembling starch corpuscles. (See Amyloid Concretions.)

Mineral Degeneration of the Exudations.—All the forms of exudation after their soft parts are absorbed may occasionally leave behind them a greater or less quantity of mineral matter. Thus, on serous membranes, in areolar textures, in the sinuses leading from chronic abscesses and so on, masses of earthy matter are met with, formed of amorphous mineral substances, composed of phosphate and carbonate of lime. These are evidently the result of a simple exudation, the animal matter of which has been absorbed, whilst the mineral constituents in excess are aggregated together, and form laminæ on membranes, or nodules in parenchymatous organs. I have seen the gall-bladder in this way converted into a calcareous shell and the pericardium into an unyielding mineral box, inclosing the heart. The cardiac valves are also especially liable to these mineral incrustations. A *cancerous exudation* in the same manner undergoes the calcareous transformation. The mesenteric glands may not unfrequently be observed to be partly cancerous and partly cretaceous.

* Mikroskopischen Pathologischen Anatomie, Taf. xv.

Fig. 322. Mineral degeneration of the nerve-cells and tubes of the spinal cord.—(*Foerster.*) 250 *diam.*

On one occasion I examined a large cancerous growth of the omentum and peritoneum, which was so loaded with phosphatic salts, that slices of it when dried lost little of their bulk. The juice squeezed from this tumour, besides masses of mineral matter, was seen to contain cancer-cells in various stages of disintegration, naked nuclei, fusiform cells, and a multitude of molecules, some fatty and some mineral. (Fig. 323). On another occasion I found the cancer-cells embedded and infiltrated throughout with minute cretaceous molecules. (Fig. 325). In cancer, as in atheroma of arteries, the mineral is often associated with the fatty degeneration. *A Tubercular Exudation* passes more readily into cretaceous and calcareous transformation than either the simple or cancerous forms. Indeed, it may be said that the natural mode of arresting the advance of tubercle is by converting it into mineral matter. I possess specimens of miliary as well as of infiltrated tubercle, arrested in all stages of their progress, by cretaceous transformation, in which case, on microscopic examination, it is seen to consist of mineral masses, associated with a few tubercle corpuscles, debris of the tissue in which it occurs, and occasionally a few crystals of cholesterine. (Fig. 326).

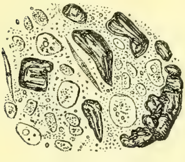
Fig. 323.

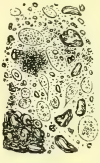
Fig. 324.

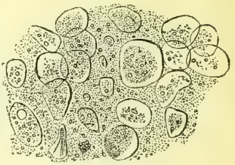
Fig. 325.

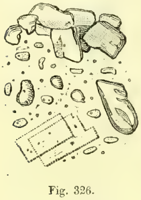
Fig. 326.

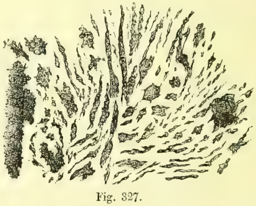
Fig. 327.

Mineral Degeneration of Morbid Growths.—Mineral deposition

Fig. 323. Mineral masses in a degenerated cancerous tumour of the omentum.

Fig. 324. The same, in a degenerated cancerous mass in the liver.

Fig. 325. Cancer-cells infiltrated with cretaceous molecules, in a mesenteric gland.

Fig. 326. Mineral masses in a cretaceous tubercle of the lung.

Fig. 327. Section of an amorphous mineral mass forming a calcareous nucleus of a uterine fibrous tumour.—(*Wedl.*) 250 *diam.*

may occur in all kinds of morbid growths, but is most common in fibroma and cystoma. In enchondroma the tendency is to form bone. The white fibrous tumours of the uterus, we have previously seen, may undergo the osseous transformation (Fig. 253); but this is an occurrence of extreme rarity. Far more commonly the centres of such growths are composed of amorphous mineral depositions (Fig. 327), which frequently increase, and invade their whole substance, causing arrestation of their progress. I have frequently found embedded in the uterine walls, mineral masses, varying in size from a hen's egg to that of a cocoa-nut, formed in this manner. Fine preparations, showing the same fact,may be seen in the Edinburgh University Museum.

CONCRETIONS.

By concretions are understood non-organised and non-vascular productions, formed by the mechanical aggregation of various kinds of matter, generally in the ducts or cavities of the hollow viscera. It has already been pointed out, that although they pass gradually into the class of mineral degenerations, several of which closely resemble concretions, still they are distinguished from them by their never having been organized, or formed out of an organic structure. They possess a remarkable disposition, however, to collect round a central nucleus, which may be organic or non-organic, and often present as the result of pure accident. Hence they generally exhibit a tendency to assume the globular or oval shape.

Albuminous Concretions.—It has already been explained that albumen may be precipitated from its solutions in the form of membrane (p. 219). This is sometimes so effected as to produce concretions, of which I have long possessed a remarkable specimen, found loose in the cavity of the abdomen. Mr. Shaw has described a similar specimen, about one half the size, of urine, containing a nucleus of fat—also formed in the peritoneal cavity.* It was excised from a hernial sac, and consisted of aggregated layers of albuminous substance, as seen in Fig. 328, 329, 330. The concentric layers of aneurismal coagula, and some so-called fibrinous

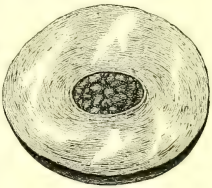
Fig. 328.

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* London Pathological Trans. vol. vi. p. 205.

Fig. 328. Longitudinal section of the albuminous concretion referred to, and its encysted nucleus of fat.—(*Shaw.*)—*Natural size.*

depositions on the valves of the heart, which subsequently become white and indurated, are of a similar character.

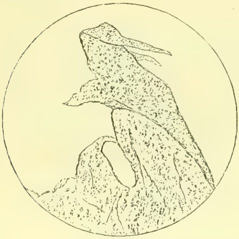

Fig. 329.

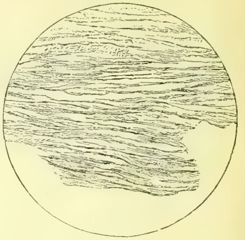

Fig. 330.

Fatty Concretions.—These constitute gall stones, which for the most part are formed of laminæ of cholesterine, associated with inspissated bile. They are found in the gall ducts or bladder, and vary in colour, size, form, and number. They may be perfectly white, when the cholesterine is almost pure. Sometimes they are brown, and at others jet black, approaching carbon in chemical composition. They may be only one large gall stone, nearly filling the gall bladder when it is oval in form; or there may be several, which, in consequence of pressure on each other, are many sided. In one case, so many as 2000 minute biliary concretions were counted in the gall bladder. The black gall stones are often rough, round, and spiculated. On section they generally present a nucleus composed of inspissated bile and mucus, surrounded by concentric rings. Occasionally, the centre is hollow, and the substance lining the cavity crystalline. The tough white masses occasionally found in cystic tumours (*cholesteatoma*) are also fatty concretions, and sometimes fatty masses have been passed by stool, more especially when the pancreas has been diseased.

Pigmentary Concretions.—These are most common in the lungs and bronchial glands of colliers, from which I have often dug out masses varying in size from a millet seed to that of a pea, with shiny smooth fractured surfaces, composed of pure carbon. Occasionally I have seen a bronchial gland converted into a cyst, filled with a thick black fluid, like inspissated paint, principally composed of carbonaceous matter, which would doubtless in time also have formed an indurated concretion.

Mineral Concretions.—This is by far the most common form of concretion found in the body, and usually results from the deposition of various salts from their solutions, often round a nucleus of foreign matter, so as to form solid masses varying in size, form, and general

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Fig. 329. Portion of one of the concentric lamellæ, of the same concretion.

Fig. 330. Transverse section of the edges of the concentric lamellæ.—(*Shaw.*) 250 *di.*

arrangement of parts. Not unfrequently the nucleus may be a portion of coagulated blood or inspissated mucus, so that mineral concretions are sometimes found in the veins (*phlebolites*) and in all mucous passages, such as the salivary, bronchial, pancreatic, hepatic, renal, etc. Fragments of degenerated mineral texture may also be pushed out from the walls of such passages and constitute a nucleus, which collects mineral matter around it. In almost all such cases, the mineral is composed of phosphate, with varying proportions of carbonate of lime, and the form of the concretion will be influenced by the size and shape of the cavity in which it is found. An excellent example of this may be seen by examining the grains of sand in the pineal gland, which will be found to consist of botryoidal masses varying in size, but constituting mineral moulds of the glandular shut sacs in which they were produced.

Urinary Concretions.—Mineral concretions, however, are by far most common in the urinary apparatus, and may be formed in the tubules or pelvis of the kidney, in the ureter, or in the urinary bladder. In the tubules of the kidney they usually assume the character of amorphous deposits, filling up and distending the tube, and presenting radiating white lines in the secreting cones. They may be composed of phosphate of lime or urate of ammonia. (Fig. 331). Occasionally masses of a putty-like substance are formed in the substance of the kidney by the accumulation of such deposits, which in time would have consolidated into calculi. More rarely the entire kidney is so infiltrated with mineral matter, that its functions are destroyed. I possess a specimen of this kind, where the organ might be supposed to be petrified, and others exist in the Edinburgh University Museum.

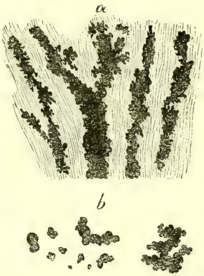

Fig. 331.

When calculi form in the pelvis of the kidney, they assume the form of the cavity, which varies, however, in different cases, being contracted in some and dilated in others. The accompanying

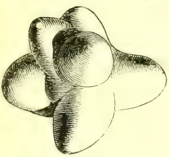

Fig. 332.

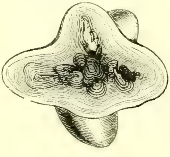

Fig. 333.

Fig. 331. Vertical section of the kidney. *a*, Some of the tubules filled with urate of ammonia, and presenting irregular black streaks, with lateral branches and twigs, 60 *di.* *b*, The molecules of urate of ammonia aggregated together in masses.—(*Wedl.*) 250 *di.*

Fig. 332. External view of a remarkable renal calculus, with projections on all sides of it but one, impacted in the pelvis of the kidney. *Real size.*

Fig. 333. Section of the same calculus, with nucleus of uric acid and oxalate of lime.

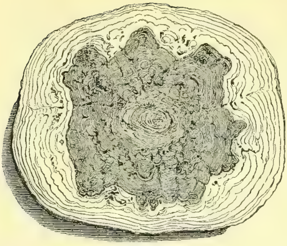
Fig. 334.

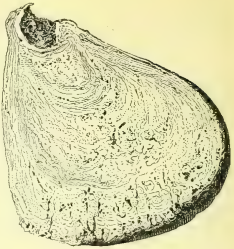
Fig. 335.

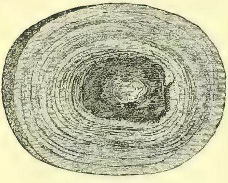
Fig. 336.

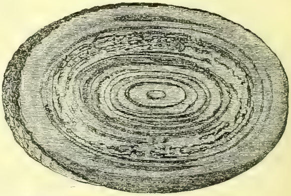
Fig. 337.

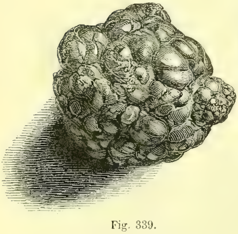
Fig. 339.

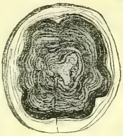
Fig. 338.

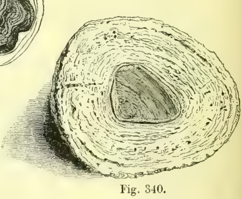
Fig. 340.

Fig. 334. Calculus with lithic acid nucleus, surrounded by oxalate of lime, and covered externally with laminæ of lithic acid.—(*Syme.*)

Fig. 335. Triangular formed calculus of lithic acid deposited round a phosphatic nucleus at one corner.—(*Syme.*)

Fig. 336. Oval calculus of lithic acid, having a lithic acid nucleus, surrounded by oxalate of lime.—(*Liston.*)

Fig. 337. Oval calculus of uric acid.—(*Liston.*)

Fig. 338. The triple phosphate surrounding a mulberry concretion of oxalate of lime.—(*Liston.*)

Fig. 339. Nodulated mulberry calculus composed of oxalate of lime.—(*R. Mackenzie.*)

Fig. 340. Phosphatic calculus formed round a fragment of uric acid calculus, previously broken up by lithotrity.—(*Syme.*)—*Real size.*

figure of a renal calculus exhibits regular protuberances, jutting out between the urinary cones from a mass formed in the pelvic cavity. (Fig. 332). Renal calculi generally give rise to constant irritation and surrounding suppuration, constituting what Rayer has called calculous pyelitis. Their chemical constitution is usually uric acid, or phosphate of lime, alone or united in various proportions.

The most frequent seat of urinary calculi is in the bladder, whence from the circumstance of their giving occasion for one of the most important operations in surgery, they have been made the subject of careful study. Here they vary in size, general appearance, and chemical constitution. In size they range from that of a millet-seed or grains, (known under the name of gravel), which may pass along the urethra, to that of a body weighing several ounces, and occupying nearly the whole bladder. In form they may be round, oval, flattened, irregular, or nodulated, and in chemical constitution may consist of phosphate of lime, triple phosphate of ammonia and magnesia, uric acid, oxalate of lime, or zanthic oxide. Not unfrequently in one calculus may be observed deposits of varying chemical depositions, round a central nucleus, indicating the predominant salts existing in the urine during the period of its formation. (Figs. 334 to 340.)

One of the most remarkable circumstances connected with vesical calculi is, that the nucleus may be composed, not only of various kinds or fragments of the calculi themselves, but of an extraordinary number of foreign substances which have been introduced from without. Thus, various rounded bodies thrust down the urethra may form the centres of these concretions. Fig. 341 represents a piece of slate-pencil as the nucleus of a phosphatic concretion. Mr. Syme removed it by the operation of lithotomy, and the man confessed he had introduced the foreign body himself, which had slipped from his fingers, and entered the bladder two years previously. One of the most extraordinary cases of this kind is that recorded by the late Dr. R. Mackenzie, in which a man in a state of intoxication was, during a quarrel, knocked down by his comrades, who cruelly thrust several horse beans into his urethra. Six months subsequently he was operated upon for stone, and five calculi removed, each of which on being cut open was found to contain a bean, surrounded by a shell of triple phosphate.* (Fig. 342.) Dr. Dunsmure has also related a case of lithotomy, where the nucleus of the stone originated in the man's falling with violence across the gunnel of a boat in such a way as to lacerate the perineum, and force a portion of his woollen

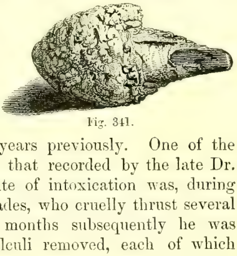
Fig. 341.

Fig. 341. Phosphatic calculus formed round a piece of slate pencil, which had been introduced into the bladder through the urethra.—(*Syme.*)—*Real size.*

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* Monthly Journal of Medical Science, January 1852.

trowsers into the bladder. I examined the nucleus of the calculus after removal, and found the fibrous substance it was composed of to consist of wool. *

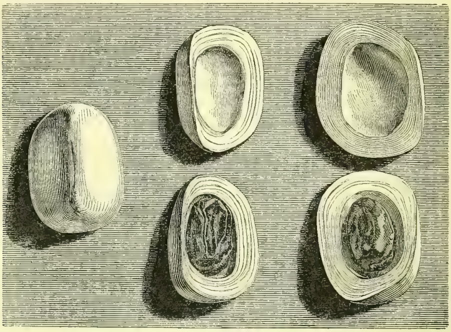

Fig. 342.

Prostatic Concretions.—The adult prostate gland almost invariably will be found to contain a number of calculi which increase in number with the age of the individual, and are often very numerous when the gland is enlarged. They are of a yellowish colour, vary in size from the $\frac{1}{800}$th to the $\frac{1}{150}$th of an inch in diameter, and are characterised by their concentric laminæ, surrounding a single or double nucleus, which also varies greatly in size. Dilute mineral acids cause the calcareous matter to be dissolved, leaving, however, the structural appearance unaffected, and rendering them occasionally soft and compressible. In this respect they resemble the amyloid bodies which occur in the

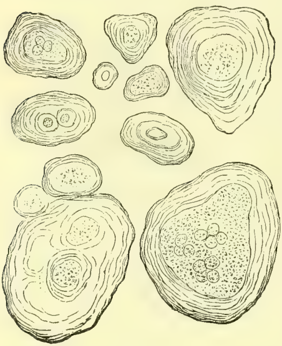

Fig. 343.

* Monthly Journal of Medical Science, January 1852.

Fig. 342. Sections and external appearance of the calculi in Mr. Mackenzie's case, formed round horse beans, introduced into the bladder in the manner described.—(*R. Mackenzie.*)—*Real size.*

Fig. 343. Prostatic calculi, exhibiting the concentric laminæ, and nuclei of these bodies.—(*Wedl.*) 250 *diam.*

arachnoid, and like them they may possibly be colloid masses, throughout which mineral matter is imbibed in a fluid state, so as gradually to convert them into calculi.

Hairy Concretions.—Balls composed of hair are not unfrequently found in the stomach and alimentary canal of the inferior animals, especially such as are in the habit of licking their hairy coats. Rare cases have been recorded where similar masses have been found in the stomach of the human subject. One of these has been published by Dr. Ritchie of Glasgow.* It was that of a factory girl, aged 21, who had contracted the habit of pulling hair from her head, while employed at work, and swallowing it. She had ileus, followed by symptoms of

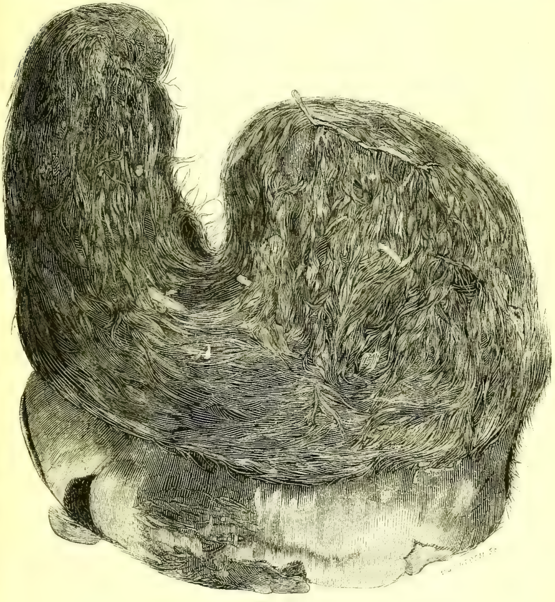

Fig. 344.

Fig. 344. Mass of hair found in the human stomach, as described above. Inferiorly it was encrusted with a layer of altered food, a fragment of which has been removed towards the left, showing the hair beneath.—(*Ritchie.*)—*Three-fourths the real size.*

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* Monthly Journal of Medical Science, July 1849.

rupture of the intestine. On dissection, the mass here figured, forming a mould of the stomach, composed of moist female hair was discovered, and two smaller ones were found in the intestines. Similar cases with hairy concretions are recorded by Pollock [*] and May. [†]

Vegetable Fibrous Concretions.—These are only found in the alimentary canal, and in man are most common in the intestines. The largest collection of them extant is in the Edinburgh University Museum, which was made by the second Monro. An admirable dissertation regarding them was published by his son, Monro tertius. [‡] Wollaston first demonstrated that they were principally composed of the fibrous matter of the oat seed, a fact confirmed by the careful researches and published figures of Dr. Douglas Maclagan. [§] These concretions vary in size from a pea to that of an orange. They are round or oval in shape if isolated, but are frequently compressed or flattened at the sides, and occasionally of very irregular shapes, according to the amount of pressure or impaction to which they have been subjected. In colour they are of a yellowish brown, but are much lighter if infiltrated with earthy salts to any unusual extent. They easily crumble down under firm pressure, and present a short fibrous

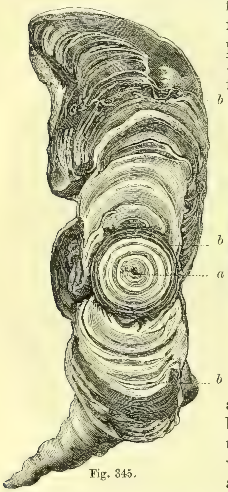

Fig. 345.

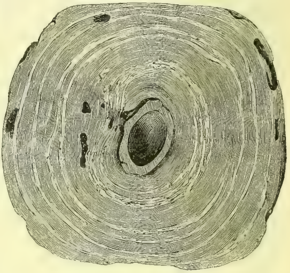

Fig. 346.

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[*] Pathological Transactions of London, 1851-2.

[†] Association Journal, No. 156, 1856.

[‡] Morbid Anatomy of the Human Gullet, Stomach, and Intestines, Edin., 1811.

[§] Monthly Journal of Med. Science, Sept. 6, 1841.

Fig. 345. Remarkably shaped intestinal concretion. *a*, Nucleus of extravasated blood; *b, b, b*, concentric laminæ. It weighed $14\frac{1}{4}$ ounces, measured 7 inches in length, and was evacuated by the rectum.—(*Huss and Mosander.*)—*Half the real size.*

Fig. 346. Intestinal concretion, with a plum stone for its nucleus, in the Monro collection of the Edinburgh University Museum.—*Real size.*

texture, like the felt of a hat. On section with a sharp instrument, they present, on the cut surface, a series of concentric lines, which are often of a lighter colour and harder consistence than the general substance of the concretion. In the centre may frequently be observed a nucleus composed of some foreign body, such as a plum or cherry stone, a piece of bone, etc. Chemically, they consist principally of fibrous vegetable matter and phosphate of lime, mingled with small proportions of water, soluble vegetable matter, fat, fœces, and a little silica derived from the structure of the oat.—(Maclagan.)

On examining a small fragment of these concretions under a power of 200 diameters linear, they are seen to be made up of an aggregation and mingling together of vegetable fibres, principally derived from the *caryopsis* of the oat, mingled in recent specimens with numerous irregular crystals and amorphous precipitate of the phosphate of lime. The fibres vary greatly in length and diameter, but in form are pointed at one extremity, truncated at the other, with a central canal, which gradually diminishes towards the pointed extremity. The accompanying figure represents a fragment taken from the concretion represented Fig. 346, from the Monro collection, in which, besides the vegetable fibres alluded to, masses of molecular mineral matter may be observed soluble in dilute nitric acid, of which the white concentric lines were principally composed. (Fig. 347.)

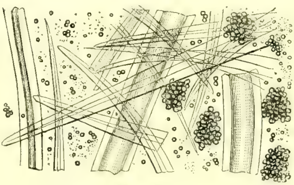
Fig. 347.

As regards the manner in which these concretions are formed, it is to be observed, that the fibres of the caryopsis of the oat possess, in a remarkable degree, the property of felting, which, as pointed out by Dr. Carmichael of Buckie,* is prevented by oil, and favoured by the use of dry substances, as fuller's earth. Both these substances are used largely in wool manufactories, the one for *carding* and the other for *felting*. I am indebted to that gentleman for some specimens of concretions, formed of oat dust (that is, the hairy covering of the oat), simply by the rotatory or oscillatory motion of the wirecloth sieve of a mill. From thence may always be collected soft concretions of various sizes, formed round pieces of thread, or other foreign bodies. The same thing appears to result in the animal body, from the peristaltic action of the intestines, when the fibrous dust is imperfectly separated from the meal, as was formerly the case in the oatmeal use largely as food for man in Scotland. Since the employment of winnowing machines, and greater consumption of meat and oleaginous substances, the formation of these concretions has become very rare. In horses, however, they are still common, and it is remarkable that in remote districts, where meal is still imperfectly prepared, cases still occasionally occur, such as the one recorded by Dr. Turner of Keith,* of a man who, in 1841, passed fourteen, and in 1845-6, other eighteen of these concretions.

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* Monthly Journal of Medical Science, June 1848.

Fig. 347. Hairs from the caryopsis of the oat, felted together, and mingled with granular masses of the phosphate and carbonate of lime. 200 *diam.*

Amyloid and Amylaceous Concretions.—Valentin,† Lebert,‡ Gluge,§ and others, have figured rounded mineral bodies with concentric circles, frequently present in the brain's substance, and more or less soluble in mineral acids. In April 1847,|| I presented a portion of a tumour to the Pathological Society of London, which was attached to the tentorium, and crowded with similar bodies. They were evidently mineral concretions, formed, however, on an organic base, varying in size from the $\frac{1}{1000}$th to the $\frac{1}{2000}$th of an inch in diameter. Their fracture was exactly like that of starch corpuscles, but they were not rendered blue on the addition of iodine. Nitric acid dissolved the mineral matter, and showed them to be composed of concentric fibres, surrounding a nucleus, with distinct nuclei. (Fig. 351). They were embedded

Fig. 348. Fig. 349. Fig. 350.

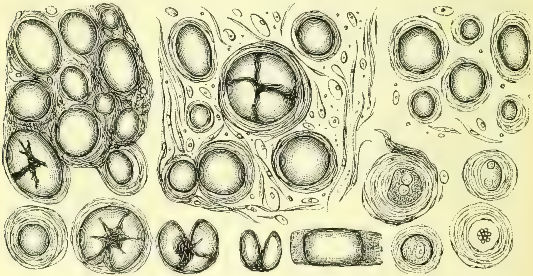

Fig. 351.

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* Monthly Journal of Medical Science, Sept. 1841 and January 1848.

† Handwörterbuch der Physiologie, Taf. 1, Fig. 2.

‡ Physiologie Pathologique, Pl. xi. Fig. 10.

§ Pathologische Anatomie, Liv. 16, Taf. 2.

|| Proceedings of Pathological Society of London, 1846-7, p. 17.

Fig. 348. Amyloid bodies embedded in a seemingly amorphous matter.

Fig. 349. The same, after dilution with water, now seen to be invested with a fibrous sheath, and surrounded by fusiform cells and naked nuclei.

Fig. 350. The same, after the addition of acetic acid.

Fig. 351. The same, after the addition of nitric acid. *a*, One of these bodies with a thick investing capsule; *b*, *c*, and *d*, others showing the various ways in which they crack on pressure; *e*, cylindrical form produced by rolling them between glasses. 250 *diam.*

in a fibro-nucleated structure, which formed a sheath round each concretion. Since then, I have frequently seen similar bodies in the arachnoid membrane and substance of the brain, and they have been also observed by Quain, and many others. These are *amyloid* bodies.

Virchow * was the first to point out that several of these bodies in the brain assumed a pale blue tint on the addition of iodine, and subsequently became violet-colour on being treated with sulphuric acid. He considered them to be cellulose, a principle which he also had shown to exist in other pathological formations. Mr. Busk † demonstrated that these bodies were optically as well as chemically identical with starch, and that they were true *corpora amylacea.* They have been found in various tissues and fluids by subsequent observers, and have been made the special subject of research by Dr. Carter, ‡ who has demonstrated their existence in almost every tissue and fluid of the human body, and in every kind of morbid product. They are of two varieties, the one (described by Busk) resembling wheat starch, the other and rarer kind corresponding in every particular with that derived from the potato.

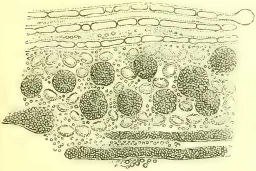
Fig. 352.

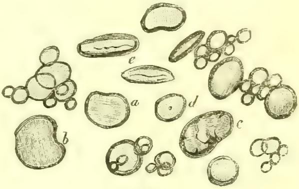

Fig. 353.

It follows, that there exists concretions, some of which resemble, while others really are starch corpuscles. The former are amyloid, and the latter amylaceous concretions. Both these bodies, without the action of re-agents, are not only liable to be confounded with each other, but with colloid and fat masses. It is questionable, indeed, whether the amyloid concretions are colloid bodies, which have subsequently become impregnated with mineral matter, or whether they are starch corpuscles that have undergone a mineral degeneration. But the relation of these two kinds of concretions to one another, to fat and colloid masses, are points which have not yet been investigated.

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* Archives, Band vi. s. 125. 1854.

† Quarterly Journal of Microscop. Science, vol. ii. p. 106. 1854.

‡ Edinburgh Medical Journal, August 1855, and Graduation Thesis, 1856.

Fig. 352. Small *corpora amylacea,* in the auditory nerve of a deaf individual, with several granule cells.—(*Foerster.*)

Fig. 353. Variously-shaped and sized *corpora aylacea,* from the human pancreas. *a,* Nucleated; *b, c, d,* variously shaped; *e,* seen edgeways.—(*Carter.*)

The presence of sugar, which has recently been shown to be always a constituent of normal blood, in that part of the circulation which lies between the hepatic and pulmonary veins, may also be connected with the formation of one or more of these non-nitrogenous substances. All speculation on this subject, however, must be hypothetical in the extreme, as it is only from the progress of organic chemistry that we can hope to derive a satisfactory explanation of those transformations which go on in the blood and tissues, so as to determine the laws regulating the production of the amylaceous and amyloid concretions.

SECTION III.

◆

ON THE RECENT CHANGES IN THERAPEUTICS, OCCASIONED BY AN ADVANCED KNOWLEDGE OF DIAGNOSIS AND PATHOLOGY.

In the previous two sections I have endeavoured to give a condensed account of the present state of diagnosis, and of the pathology of organic diseases. A practical knowledge of the one, and a better appreciation of the other, it seems to me, have been very widely diffused within the last fifteen years. In consequence, a change almost amounting to a complete revolution in our treatment of disease has within that short period taken place. It is true that this change is not yet reflected in our systematic works, although clinically it is everywhere recognised. For when we compare what the actual practice of medicine is, with what it was, or with what it is represented to be, even in modern books on the theory and practice of medicine, the discrepancy must strike even the least observant. It seems to me that the time has now arrived for calling the attention of the profession, and more especially of its youthful members, to the causes producing so important a result, and pointing out some of those principles on which an improved medical art for the future is likely to be based.

I have already alluded to the general treatment required for diseases of nutrition (p. 110), and endeavoured to show that a knowledge of the various processes of which that function is made up, is a necessary preliminary step to correct medical practice. Our agents for combating this class of disorders are nutrients, hematics, eliminatives, astringents, etc. Diseases of innervation require for their proper management the same previous knowledge, and demand as remedies stimulants, sedatives, narcotics, etc. The mode of applying these can only be understood by treating maladies in detail, whilst for what is known of the general principles of their action I must refer to special works on this subject.* It seems to me, however, that hitherto most remedies have been employed too much in reference to symptoms, and with too little regard to the pathological states producing those symptoms, or to the intimate relation existing between the nutritive and nervous functions. For instance, impaired digestion may cause headache and sleeplessness. We can relieve the latter symptoms by morphia. But if this remedy increases the want of appetite, which it does, what have we gained? only temporary palliation of the more urgent symptoms, whilst their cause, so far from being removed, is really intensified. This distinction between a palliative and a curative treatment has been too much overlooked in medical practice. Drugs have been given to relieve symptoms, while the causes producing these have not been sufficiently attended to. Need it then excite surprise that as our knowledge of pathology has advanced, and our means of diagnosis has improved, this discrepancy has become more apparent, and that we now direct attention more to the causes and less to the effects of disease.

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* See especially Headlam on the Action of Medicines.

Even to enumerate the changes which have recently taken place in medical practice, as a result of this mode of viewing diseases, would be here impossible. They will be referred to in the special part of the work. Two great facts, however, seem to me, from their universal importance, to demand attention at present. These are—1*st*, The diminished employment of blood-letting, and other antiphlogistic remedies in the treatment of acute exudations, or so-called inflammations; and 2*d*, The power which it has been demonstrated may be exercised over certain diseases of innervation, through the influence of suggestion or strong impressions made upon the mind. Both these facts have recently excited great attention and discussion; their influence on medical theory and practice has already been great, and their explanation on scientific grounds seems to be called for, with a view of establishing correct principles for our future guidance.

THE DIMINISHED EMPLOYMENT OF BLOOD-LETTING AND OTHER ANTIPHLOGISTIC REMEDIES IN THE TREATMENT OF ACUTE INFLAMMATIONS.

It must be admitted by all who contemplate the actual state of medical practice in this country, that the use of blood-letting, and of other antiphlogistic remedies, has within a recent period greatly declined. According to Dr. Alison,* however, such remedies, but more especially blood-letting, were formerly highly successful by arresting the disease; whereas, now they are injurious, and fail to do so, and the inference he draws from these supposed facts is that inflammation itself is no longer the same, that its type and more especially the febrile symptoms accompanying it, have altered from an inflammatory to a typhoid character, and that the practice, according to the correct therapeutical rules of our forefathers, has very appropriately changed with it. In short, it seems to be Dr. Alison's opinion, that our advanced knowledge of diagnosis and pathology has had little influence in producing this great revolution in our treatment, but that the human constitution (in a manner which is not sought to be explained) is fundamentally altered, and that medical men were as right in bleeding twenty years ago, as they are correct in now abstaining from it. In opposition to these views it will be my endeavour to show—1*st*, That little reliance can be placed on the experience of those who, like Cullen and Gregory, were unacquainted with the nature of and mode of detecting internal inflammations. 2*d*, That inflammation is the same now as it has ever been, and that the analogy sought to be established between it and the varying types of essential fevers is fallacious. 3*d*, That the principles on which blood-letting and antiphlogistic remedies have hitherto been practised are opposed to a sound pathology. 4*th*, That an inflammation once established cannot be cut short, and that the only object of judicious medical practice is to conduct it to a favourable termination. 5*th*, That all positive knowledge of the experience of the past, as well as the more exact observation of the present day, alike establish the truth of the preceding propositions as guides for the future.

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* Edinburgh Medical Journal, March 1856.

PROPOSITION 1.—*That little reliance can be placed on the experience of those who, like Cullen and Gregory, were unacquainted with the nature of, and the mode of detecting, internal inflammations.*

Inflammation for many years was generally recognised, especially in external parts, by the existence of pain, heat, redness, and swelling, and in internal parts by fever, accompanied by pain, and impeded function of the organ affected. In short, groups of symptoms, in accordance with the nosological systems of the day, constituted inflammation. But the school of morbid anatomy, by showing that inflammation was a diseased condition of a part, entirely overthrew the errors and confusion inherent in all such nosological systems. Clinical observation, based on a more correct diagnosis and pathology, has since demonstrated that artificial nosological groups of symptoms bear no relation whatever to the internal inflammations they were formerly supposed to indicate, and has led to a mass of information connected with internal disease, which, up to this time, has never been correctly systematised. Again, more recent histological research, by exhibiting to us that inflammation is in truth a disease of nutrition, governed by the same laws that determine the growth and functions of cells, as they exist in the embryo and in healthy tissues, and thus uniting physiology and pathology into one science, has removed our present knowledge still further from the traditional errors of the past. Why, then, should we in our onward course be governed by the opinions of Cullen and Gregory, of Gaubius and Sydenham, of Aretæus and Hippocrates? These distinguished men all pushed forward medicine in their day, as far as they were enabled by the then state of science and the means within their reach; but the principles which guided them ought no more to be considered laws to be followed now by practical physicians, than should the exploded astronomical doctrines of Copernicus and Tycho-Brache be acted on by practical navigators. It is not my intention, therefore, to enter into a lengthened refutation of the opinions of former writers, or even of many modern ones, in determining what pathologists now understand by the term inflammation. What I mean by it in the following remarks, is *an exudation of the normal liquor sanguinis;* and Dr. Alison evidently means the same thing, when he acknowledges "that exudation of lymph is essential to almost all changes of structure produced by inflammation." Whatever, then, may have been formerly understood by this word inflammation—in whatever way it may be now applied—whether to the congestion of the blood-vessels, the exudation of liquor sanguinis, or to the change in the texture causing these phenomena—it is important to remember that in speaking of it both Dr. Alison and myself mean a change in a part characterised by the exudation of lymph through the walls of the minute vessels, resulting from changes more or less well marked in the nervous, vascular, sanguineous, and parenchymatous elements of that part, which it is unnecessary here to describe. (See p. 129, *et seq.*)

As regards diagnosis, it must be acknowledged by all parties that, up to a recent period, internal inflammations were sought to be recognised only by symptoms. But medical men who have of late years studied these inflammations by physical signs, as well as by symptoms, must have come to the conclusion that the latter alone are altogether insufficient to enable us to determine the existence of internal inflammations. This is a point which, if necessary, could be established by innumerable facts, showing, 1st, That where all the symptoms of inflammation have been present, yet *post-mortem* examination has demonstrated the absence of the lesion. And, 2dly, That inflammation has been the cause of numerous deaths, without one of the symptoms generally supposed to be its accompaniments having been present. But here, also, it is unnecessary for me to enter at any length into this question, because it is admitted by Dr. Alison that we can now detect inflammation of the lungs "in cases where there is so little of pain, or cough, or dyspnœa, or inflammatory fever, that we should not in former times have given them the name of pneumonia." But when he goes on to say that "the cases of pneumonia thus overlooked, were attended with little or no immediate danger," I am constrained to dissent from this opinion, for it appears to me that many of these cases, especially such as are complicated and occur in old age (the so-called latent pneumonias) are, at this moment, the most fatal, and that they always must have been so. On the other hand, the symptoms which formerly were supposed to indicate a pneumonia, viz., pain, cough, dyspnœa, rusty sputa, and fever, we now know are met with in a variety of lesions, independent of pneumonia, especially in certain cases of bronchitis in young subjects, or engorgements and apoplexy of the lung, associated with fever or heart disease in older persons. Hence, formerly, bleeding was not practised in many cases where pneumonia was present, whilst it was largely resorted to in others where that disease never existed at all.

Other writers besides Dr. Alison have endeavoured to show, and not unsuccessfully, that what was formerly understood by pneumonia or peri-pneumonia, is altogether different from what we now mean by these terms. But they have not been so successful in deducing from the experience possessed by former physicians in treating symptoms, what ought to be the rule of practice for those in modern times who recognize the anatomical lesions of organs. If, indeed, it could be shown that the group of symptoms formerly called inflammatory, always indicated the same morbid lesion, former experience might still be useful to us. But we contend that this is what clinical observation proves to be impossible. Such are the contradictory statements and the confusion resulting from the unacquaintance of the past race of practitioners with diagnosis and pathology, that no confidence whatever can be placed in their impressions, as to what cases are benefited by bleeding.

Hence, although I am far from repudiating experience in cases which in the present day are clearly recognizable as true inflammations, it is surely unreasonable to be guided by that experience in cases where it is acknowledged that the observations are imperfect and vague, and which, even among those who desire to take advantage of it, gives rise to endless differences of opinion as to what was meant or intended. Medicine is not a scientific art which is dependent for its principles on the study of, and commentary on, the older writers. What *they* thought and what *they* said, are not, and ought not in a question of this kind to be our guide, as to what was or is. On the contrary, it is the book of nature, which is open to all, that we ought to peruse and study, and why should we read it through the eyes of past sages, when the light of science was comparatively feeble and imperfect, instead of bringing all the advanced knowledge of the present time, to elucidate her meaning. The lesson which a careful study of the history of medicine has forced upon me, is the necessity of re-investigating, with all our improved modern appliances, the correctness or incorrectness of existing dogmas, in order to establish an improved practice for the future.

PROPOSITION 2.—*That inflammation is the same now as it has ever been, and that the analogy sought to be established between it and the varying types of fevers is fallacious.*

The essential nature of inflammation has been already alluded to, viz., a series of changes in the nervous, sanguineous, vascular, and parenchymatous functions of a part terminating in exudation of the liquor sanguinis, or what some call effusion of lymph. How can it be shown that any of these necessary changes have of late years undergone any modification? If a healthy man receive a blow, or any other injury is inflicted on his person, are the resulting phenomena in these days in any way different from those which took place in the days of Cullen and Gregory? Are the effects which followed wounds received at the battle of the Alma, different from those which resulted from similar injuries at the battle of Waterloo? This has not yet been shown. Do we observe any essential difference in our civil hospitals in the effects of injuries, or in the process of healing, after wounds and operations? This also has not been shown. Again, if a healthy individual now-a-days be exposed to cold or wet, and be seized with an inflammation of the lungs or pleura, is not the lung hepatized in the one case, and do not layers of organizable lymph form in the other, in exactly the same way as formerly? If so, is not hepatization removed, and does not the lymph contract adhesions in the same manner now, as in the days of Cullen and Gregory? If these changes have been materially modified in recent times, I again urge that such modifications have not been shown; and if they have not, in what can it be said that inflammation and its results have changed within the last twenty years?

To this question, notwithstanding repeated careful perusal of Dr. Alison's paper, I am obliged to say I can find no answer. It is true he points out that the *symptoms* of pneumonia of Cullen differ from those of the pneumonia of Grisolle. He also contends that it is only from the symptoms that we can judge of the effects of remedies. But before we can draw a comparison between variations in such symptoms as indications of the value of treatment, or found upon them a doctrine like the change of type in any given disease, it must be shown that the symptoms observed formerly and those seen now belong to the same lesion. No such comparison, however, can be drawn, because what Cullen meant by pneumonia were the symptoms themselves, whereas now such symptoms are known to be in no way necessarily indicative of pneumonia as previously explained.

Under these circumstances nothing can be more unsatisfactory than to enter into an inquiry as to whether the inflammatory fever and hard pulse of Cullen's pneumonia—which may or may not have been pneumonia at all—does or does not differ from a true inflammation of the lung, as we now recognise it. Dr. Alison, by drawing a comparison between the two, seems at least to think they are allied, and he argues that the fever accompanying the one was inflammatory, whilst that accompanying the other is typhoid. Hence the reason why he thinks the first did, whilst the last does not bear bleeding. He has also long argued[*] that these differences are still observable in private or dispensary, and in hospital practice. But I have had abundant opportunity of satisfying myself that a true pneumonia is the same under every circumstance. During a seven years' tolerably constant attendance as physician to the Royal Dispensary of this city, I have seen pneumonia as typhoid as it can well be; and in the Infirmary during the last nine years, I have seen it attack vigorous, healthy young men, and present all the characters of the inflammatory type. These last are exactly those cases which do best without blood-letting, whilst at the same time, they are those also which bear bleeding well. The explanation of these (to some) apparently contradictory facts will be given subsequently.

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[*] Outlines of Pathology and Practice of Medicine. First Edition, p. 221.

Another idea very extensively prevails on this subject, and is urged by Dr. Alison, viz., that inasmuch as fevers undoubtedly present changes in type, inflammations may do so likewise. That essential fevers at different times are typhus, typhoid, or ephemeral, cannot be doubted, but this evidently depends on variations in the intensity or the nature of the exciting cause. On what these differences depend is not yet determined. I have watched extensive epidemics of fever in France and in the Rhenish provinces, where almost every case is typhoid and connected with intestinal lesion, and observed others in Edinburgh, where nearly every case is typhus, and free from organic lesion. I also noticed that, when owing to failure in the potato crop, as in 1846, the food of the people was materially changed for the worse, the fever in Edinburgh assumed far more of the typhoid type; and I have no doubt that changes in diet, in locality, in climate, in atmospheric influences, and a variety of causes, may induce modifications in fever. But surely no analogy ought to be drawn between the undoubted changes producing such varieties of fever, and those causing an inflammation which in all countries, and under every variety of external circumstance, are always the same. Even the results are said to be distinguishable only by a change in the force of the pulse.

But what should this asserted change in the force of the pulse indicate? It is said that instead of being strong and hard in cases of pneumonia as it used to be, it is now more soft and indicative of debility. Is it then argued that the whole people of this country, since the days of Cullen and Gregory, have become so debilitated and deteriorated—that their constitutions have been so altered for the worse, that attacked by the same lesion and to the same extent, there is no longer the same reaction? and that the strong man of the present day labouring under inflammation, presents the symptoms which twenty years ago distinguished the weak one? If so, where is the evidence of this? Are our soldiers and sailors, workmen or others, physically less capable of exertion than formerly? Is it true that the strength of mankind has so radically altered for the worse during the last twenty years, as to account for the supposed fact that inflammation formerly required excessive loss of blood to check its progress, whereas now it stops of itself? For my own part, I have earnestly sought for, but cannot discover, a shadow of evidence for such a belief. Moreover, I have a most lively remembrance of all the facts and circumstances connected with the bleeding of many patients twenty-eight years ago, when I first commenced the study of medicine, as well as of such as took place in the Royal Infirmary of Edinburgh, when I was a student in this university in 1833; and my impression is, that not the slightest difference exists between the character of the pulse now and what it was then.

I have been informed by some Indian practitioners that in the East blood-letting is now as little practised as it is among ourselves—so that if Dr. Alison's theory be correct, inflammation among the Asiatic nations and Hindoo tribes has undergone the same change of type, as is alleged to have taken place in Great Britain. But I have also heard that in Italy large blood-lettings are still practised as they were formerly; and I know from actual observation that M. Bouillaud still pursues the *coup sur coup* treatment in acute inflammations in his wards of La Charité Hospital, Paris. On visiting him there last August, I saw several patients (all young persons) whom he had treated in this way, and who were then convalescent. On asking him whether he had observed any change in the character of the pulse, or a more typhoid character of the fever in recent times, his reply was emphatically "certainly not." A similar reply was made to the question by every practitioner I interrogated in Paris, who attributed the general diminution of blood-letting in France to the gradual emancipation of medical men's minds from the doctrines of Broussais. Is it not more reasonable then to think, that the change of practice in India results from an alteration in precept and example, and that the continuance of the practice in Italy and in the wards of M. Bouillaud, is owing to the absence of such change, rather than to suppose that inflammation alters its type, just where the practice alters, but remains stationary in those countries, and even in those wards of an hospital where it does not?

Hence, I am firmly of opinion, that inflammation in a part is the same now as it has ever been, and is only subject to the variations which occur in all diseases, such, for instance, as are dependent on differences of age, sex, vigour of constitution, complications, etc. etc. These are also alike at all times, and consequently the recent revolution in the treatment of inflammation by bleeding, cannot be accounted for by the theory of change of type.

Proposition 3.—*That the principles on which blood-letting and antiphlogistic remedies have hitherto been practised are opposed to a sound pathology.*

Large and early bleedings have been practised under the idea that by diminishing the amount of the circulating fluid—1st, The *materies* *morbi* in the blood would be diminished; 2dly, Less blood would flow *to* the inflamed parts; 3dly, That the increased quantity of blood *in* the part would be lessened; and 4thly, That the character of the pulse was the index as to the amount of blood that ought to be drawn. Let us examine these four principles of practice—

1*st. Can the* MATERIES MORBI *in the blood be diminished by bleeding?* It was to its influence on the blood that the older writers especially attributed the good effects of venesection. This fluid according to them was thrown into a state of ebullition or fermentation, which worked off the morbid elements; and this termination was favoured by removing so much of it by blood-letting. On the other hand, if the morbid matters were not readily removed, they fell upon internal organs causing inflammation. This idea led to the abstraction of blood, under the notion that that fluid was diseased first, and local lesions supervened, as in the case of plague or small pox. Thus Sydenham apparently had no idea of inflammation distinct from fever. He says, "I think pleurisy is a fever originating in a proper and peculiar inflammation of the blood —an inflammation by means of which nature deposits the peccant matters on the pleuræ. Sometimes she lays it on the lung itself, and then there comes a peripneumony. This differs from pleurisy only in degree. They exhibit the results of the same cause with greater intensity. In my treatment I have the following aim in view—to repress the inflammation of the blood, and to divert those inflamed particles, which have made an onset upon the lining membrane of the ribs (and have there lit up so much mischief), into their proper outlets. For this reason my sheet anchor is venesection."* Such was the pathology and practice of Sydenham, the latter following consistently enough on the former; and the essential idea of diminishing the morbid matters in the blood has not only descended from Hippocrates to the days of Sydenham, but has come down from his to our own times.

Now, in one sense, it is true that there is no disease whatever, even the one which is most local, that is not also associated with a general change of the system. As before stated (p. 110) all the nutritive functions are connected with one another, and an excess or diminution of local growth, by subtracting from or adding to the constituents of the blood, must produce an alteration in that fluid both as to quantity and quality. The idea of Treviranus, viz., that "each single part of the body in respect of its nutrition, stands to the whole body in the relation of an excreted substance," has been ably shown by Mr. Paget to account for various processes in health, under the name of "complemental nutrition."† The same notion has been still further extended by Dr. Wm. Addison, who correctly points out that in the distinctive eruptive fevers, such as small-pox, the numerous small abscesses in the skin eliminate the morbid poison which formerly existed in the blood, and are in this way essential to the cure. This provident action he denominates "cell-therapeutics."[*] In all such cases experience has shown that time and a natural sequence of changes is necessary for a restoration to health, and it is now recognised that the idea of cutting short such changes by bleeding, is alike erroneous in theory, and injurious in practice.

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* Sydenham Society's Translation. Vol. i. p. 247.

† Lectures on Surgical Pathology, Lecture ii.

Now exactly the same principle ought to guide us in cases of inflammation, where, in addition to the local changes in the part, there must necessarily be more or less disturbance of secretion and excretion. The blood in consequence must, and does, as is now well known, undergo definite alterations, which, it is true, organic chemistry has not yet fully explained to us, but by which we have at least learnt that the particular secretion suppressed is always accumulated in the blood, which also contains an excess of fibrin. The careful investigations of chemists, and especially those of Becquerel and Rodier, have further shown us that whilst venesections greatly deteriorate the blood, rendering it poorer in corpuscles and richer in water, that they have no effect on the fibrin whatever. It follows that an elimination of the morbid products can only be accomplished in inflammation by the conjoined action of cell growth in the part, and a peculiar vital chemistry going on in the blood, (as will be subsequently explained), neither of which can in any way be facilitated, but, on the contrary, are both, in the vast majority of cases, impeded by blood-letting.

2*d*. *Is it good practice to diminish the flow of blood* TO *the part?*—The increased throbbing and circulation of blood in the neighbourhood of an inflamed part may be shown not to be the cause of inflammation, but the result of it. The idea of so called determination of blood being the cause of disease is thus set forth by Dr. C. T. B. Williams:[†]—"In the frog's web, gently irritated by an aromatic water, we see the arteries become enlarged, supplying a larger and more impulsive flow of blood to the capillaries and veins, which all become enlarged also; and the whole vascular plexus, including vessels which before scarcely admitted red particles, then become the channels of a much increased current. This is determination of blood."—p. 203. Again, "We may affirm from direct observation, as well as from reasoning, that determination of blood is caused by enlargement of the arteries; and this enlargement is the effect of the pressure of the arterial distension from *behind* acting on a tube, which has lost some of its contractile power."—p. 203. Again, "One patient was subject to attacks of determination of blood, which caused him so much suffering and loss of moral control, that he cut his throat to destroy his life. When recovering from the wound, attacks sometimes came on; *first* with beating of the carotids, then flushing of the face and head, suffusion of the eyes, and sensations of distraction in the head." "Fits of epilepsy and convulsive hysteria are immediately *preceded* by throbbing of the carotids, which shows that determination of blood is the proximate cause of the paroxysm."—p. 201. Now if I am correct in supposing that the meaning of these passages is, that the larger arteries assume the initiative, take upon themselves the action of a forcing pump, and send or determine more blood to the part, then it appears to me there must be error both in observation and reasoning. So far from the enlargement of arteries and increased current preceding the changes going on in the capillaries—so far from being connected with the causes of inflammation—I venture to affirm that they are the results.

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[*] Addison on Cell-Therapeutics, 1856.

[†] Principles of Medicine. (Third Edition.)

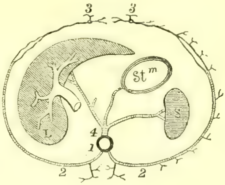
In all cases the primary stimulus producing inflammation is applied to the vessels of the part, either directly (as from injuries or irritants) or indirectly, that is by reflex action (as in the case of internal inflammations following exposure to cold, etc.), and in consequence, that is to say, as a *result* of the local change in the part thereby occasioned, there follows the throbbing of the neighbouring arteries. Let us attend to what takes place in the finger from a thorn entering the skin, and which is not extracted; the irritating body first acts upon the nerves and blood-vessels of the part, then comes on the stoppage of blood and exudation, and lastly follows the throbbing of the artery in the finger. Surely this throbbing, which is the evidence of so-called determination, is a result of the inflammation, and not a cause of it. The blood in this case, instead of being sent by a *vis a tergo*, is in fact drawn by a *vis a fronte*, and, as we shall endeavour subsequently to show, for the most important purposes. Whether would it be reasonable to treat such an inflammation by opening the artery—or by favouring the transformation of the exudation thrown out into pus, whereby the irritating cause and its results are both got rid of? All experience shows that the latter is the proper treatment, and that wounding the artery under such circumstances would probably be highly injurious by producing gangrene.

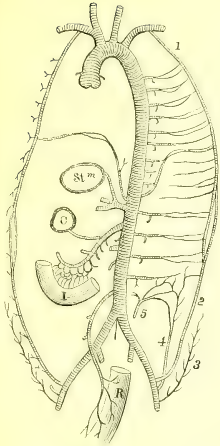
But why should nature, in cases of inflammation, draw an increased amount of blood towards the part? She does so, it seems to me, in obedience to one of her wisest laws, but one which has been too much ignored by medical practitioners. It must be obvious, however, that, an inflammation having occurred, the great work now to be accomplished is an increased growth by cell formation, whereby that exudation is to be broken up, the pressure it exerts on the nerves and blood-vessels removed, and the whole rendered capable of being eliminated from the economy, either directly by discharge externally, or indirectly, 1st, by passage into the blood, and, 2d, by excretion through the emunctories. To perform this work of increased growth, an augmented flow and amount of nourishing fluid is necessary, the same as is observable at the period of heat in animals, to ripen the Graafian vesicles; in the stag's scalp during the growth of the antlers; in the mamma when milk is first secreted; in the gums during the process of dentition; in the ascent of the sap during spring in plants, etc. etc. In all these cases, especially the last, the fluid is not sent or determined, but drawn to the part, in consequence of the increased growth of cells imperatively requiring a greater amount of blastema. So in inflammation, an exudation having been poured out, which has to be transformed by a process of cell growth, in order that it may be removed or rendered subservient to the wants of the economy, it is absolutely imperative that the part in which these nutritive changes go on should receive more blood, to enable it to accomplish them. Hence the increased current. But hitherto medical practitioners have supposed that this phenomenon is injurious, and ought to be checked by blood-letting and antiphlogistics. The rapid flow of blood, which is so necessary, they have sought to diminish; and the increased amount in the neighbourhood of the part, which is so essential for the restoration to health, it has been their object to destroy. In doing so, we argue they act in opposition to sound theory, and, as we shall afterwards attempt to show, to good practice also.

3*d*. *Can general blood-letting diminish the amount of blood* IN *the inflamed part?* It is vain to deny that the notion of lessening the amount of blood *in* the inflamed part has constituted one of the chief reasons for blood-letting, and given rise to long discussions as to whether this or that vein shall be opened, and whether leeches shall be applied to the occiput or to the feet. Now, it requires to be shown that draining the body of blood can in the slightest degree influence the congestion in the inflamed part. *There* the vessels are enlarged, the current of blood is arrested, the blood-corpuscles are closely aggregated together and distend the vascular tube, and are in no way affected by the arterial current, even when increased in its neighbourhood. That opening a vein can alter this state of matters is scarcely to be conceived; and if it could, how would this assist in removing the exudation, which has coagulated outside the vessels?

A consideration of the connection and distribution of the large vessels in the body will still further show the little probability there is of either general or local blood-letting, as usually practised, being capable of influencing the amount of blood in the part actually inflamed. How is it possible, for instance, that venesection in the arm can *directly* diminish the amount of blood sent from the heart by the great pulmonary artery to the lungs, by the carotids and vertebrals to the brain, or by the coronaries to the heart itself. In inflammation of those organs, blood-letting, to be of any use, must be large, so as to affect the general system *indirectly* by weakening the heart's action and producing syncope, and this at a time when, from no nourishment being taken in consequence of fever, great prostration of the vital powers is to be expected. But whilst this effect may certainly be

Fig. 355.





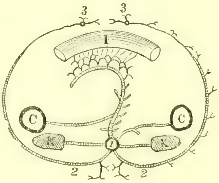


Fig. 356.

Fig. 354.

Fig. 354. Longitudinal plan of the arteries of the trunk. The left side shows both the longitudinal and transverse anastomosing arteries of the wall; the right side only the longitudinal and diaphragmatic anastomoses belonging to the wall, and the various visceral arteries springing from the aorta.

Left Side.—1, Internal mammary; and 2, deep epigastric; connected behind to the aorta by a series of intercostal, lumbar, and diaphragmatic arteries 3, Superficial epigastric. 4, Circumflex iliac. 5, Ilio-lumbar from internal iliac.

Right Side.—Branches of abdominal aorta, from above downwards; diaphragmatic, cœliac axis, superior mesenteric, right supra-renal and renal, right spermatic or ovarian, and inferior mesenteric.—(*J. Struthers.*)

Fig. 355. Transverse plan of the arteries of the abdomen opposite to the liver, spleen, and stomach. 1, Aorta, giving off from its back part the arteries (2, 2) for the wall, which unite in front with branches of the internal mammary arteries (3, 3). 4. Cœliac axis, coming from the front of the aorta, and supplying the spleen, stomach, and liver, the latter also receiving the vena portæ —(*J. Struthers.*)

Fig. 356. The same, lower down, showing a portion of the small intestine and sections of the ascending and descending colon and of the kidneys. 1, Aorta, giving off, behind, the lumbar arteries (2, 2), which join in front with branches of the deep epigastric (3, 3). In front, as if coming from the aorta at the same part, are shown the superior and inferior mesenteric, and at the sides the renal arteries. Fig. 354 shows the order in which these visceral arteries come off at different stages of the aorta, and their relative size.—(*J. Struthers.*)

The anatomist will notice that it is chiefly the anastomosing branches of the arteries of the wall which are shown, and also that these are represented proportionally larger than natural.—(*Struthers' Anatom. and Physiol. Observations.* Edin. 8vo. 1854.)

induced by large bleedings, the inflammation in the part is altogether unaffected. The exudation, under such circumstances, which requires more blood in order that it may undergo the necessary transformations previous to removal, is then arrested in its development, and, so far from being rapidly removed, remains stationary, or dies in proportion as the economy is exhausted. If, on the other hand, small or moderate bleedings are practised, how can they operate even on the principles of those who advocate them ? These do not affect the heart, or lower the force of the circulation, even in the neighbourhood of the inflamed part ; how, then, can they operate on the stagnant blood in the inflamed part itself ?

As to local bleeding, its supposed effects are inexplicable on the supposition of drawing blood from the inflamed internal parts. A man has pneumonia or nephritis, resulting from changes in the vessels which are supplied direct from the aorta, and leeches are applied to the integuments supplied by vessels derived from the mammary or lumbar arteries. Any direct anastomosis between the vessels on the surface and those in the parts inflamed is not to be thought of, as has been shown anatomically by Dr. J. Struthers, (see Figs. 354 to 356, with the explanations on the previous page.) How, then, does the loss of this small amount of blood operate in these important cases ? It cannot be by any conceivable theory of diminishing either the current to, or the amount of blood in, the part. As in the majority of cases, therefore, the loss is not large enough to affect the general circulation, and as anatomy prevents our belief in the idea that it can influence the inflammation directly, it may well be asked how can local blood-letting be of any benefit at all ? Is it not more probable that leeches and cupping do no good by drawing blood, but that the relief of pain they undoubtedly occasion is owing to the reflex influence of counter irritation, and in the vast majority of cases to the soothing and sedative influence of the warm fomentations which generally follows their employment ? Dry cupping is often as effectual as local blood-letting.

From these considerations, it follows that neither general nor local blood-letting can possibly be supposed to diminish the amount of blood in internal parts affected with inflammation.

4th. Should the character of the pulse indicate the propriety of bleeding ? That an accelerated and strong pulse in inflammation demands interference on the part of the medical practitioner seems to be a principle which has been very generally acted on. In other words, because nature accelerates and strengthens the pulse, it has been thought that art ought to interfere and diminish its force and frequency. But here, again, as it appears to me, the result has been mistaken for the cause ; and so far from getting rid of inflammation by weakening the pulse, we not only do not check it, but prolong the time, as previously explained, for the transformation of the exudation. This, indeed, is acknowledged by Louis, Chomel, and Grisolle, who distinctly show that the progress of a pneumonia is never shortened by bleeding. Dr. Alison also admits that he has seen dulness with crepitation continue to spread *after* bleeding. But the inconsistency of the therapeutical rules on this head will become more manifest when we remember that it is necessary, in the opinion of many medical practitioners, not only to weaken the pulse when it is strong, but to strengthen it when it has been made weak. Now, although it is obviously good practice to support the strength when the calls upon the nutritive functions have exhausted the economy, it is injurious to diminish, by bleeding, the nutritive processes themselves, when they are busily engaged in operating on the exudation and eliminating the morbid products. In short, we argue that the phenomena of fever and excitability following inflammation have been wrongly interpreted, and that danger is to be apprehended from them not directly, but from the subsequent exhaustion which all great exertions of the animal economy produce. In themselves, these are sanative, and indicate the struggle which the economy is engaged in when attempting to get rid of the diseased processes; and we only diminish the chances of that struggle terminating favourably by lessening the vital powers at such a critical juncture. This proposition seems to be universally admitted in the case of essential and eruptive fevers; and exactly the same rule ought to apply in cases of inflammation.

It has been argued, however, that the relief which blood-letting produces justifies the practice. But this is a therapeutic question of the greatest importance, and one which, I venture to think, has not been sufficiently considered by medical men. No doubt pain is a great evil; and mankind instinctively seek for its relief, and sometimes at any cost. But if the possession of life be an advantage, it is sometimes only to be maintained at the price of suffering more or less privation and pain. It is in this point of view that disease may frequently be considered as a benefit and a great good, mercifully sent by a wise Providence to reconcile man under a variety of circumstances to death itself, as to a great relief. But such is not the therapeutic or curative method of considering the question; the great object of the physician being *first* to cure, and, should his attempts in that direction fail, *then* to relieve. If both objects can be accomplished, so much the better; but if the means of relief are opposed to those of cure, then to obtain the latter the former must be unhesitatingly sacrificed. I have pointed out in another place how much this principle has been overlooked in the treatment of pulmonary tuberculosis;* and in no case does it appear to have been more disregarded than in inflammation. For assuming it as granted that in some cases the pain is for a time relieved by bleeding, and that in pneumonia the respiration temporarily becomes more free, at what a cost are these advantages obtained, should the patient be so weakened as to be unable to rally. Even if he does rally, a large bleeding almost always prolongs the disease. Of course I am now speaking of a true pneumonia, and not of that combination of symptoms which was *called* pneumonia by Cullen and Gregory. I do not consider it necessary to cite cases in proof of the fact that in many instances bleeding has done great mischief, because this will be readily admitted by all candid medical men.

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* The Pathology and Treatment of Pulmonary Tuberculosis, by the Author. Edinburgh, 1853, p. 84, *et seq.*

But whilst large and repeated bleedings, practised with a view of arresting the disease, appear to me opposed to a correct pathology, small and moderate bleedings, directed to palliate certain symptoms, and especially excessive pain and dyspnœa, may reasonably be had recourse to, and unless there be great weakness, without any fear of doing injury. I have often been struck, especially in cases where large thoracic aneurisms cause these symptoms, with the small loss of blood which will occasion marked relief. The same result may be hoped for in other cases where the congestion is passive, even when that is associated with active repletion of blood, followed by exudation. But I need scarcely remark that this mere palliative object of blood-letting is not the ground on which the practice has hitherto been based, and that in this point of view it requires to be very differently explained. To this subject I shall again allude. (See p. 287.) In the meantime, it follows from the arguments which have been adduced under the present head, that the past principles which have indicated the practice of bleeding in inflammations are erroneous. It now remains for me to advance and endeavour to establish to the satisfaction of my readers what appear to me to be the true principles of treatment.

Proposition 4.—*That an inflammation once established cannot be cut short, and that the only end of judicious medical practice is to conduct it to a favourable termination.*

There was a time when it was supposed that typhus fever, small pox, and many other diseases, which are now always allowed to run their natural course, were curable by medical interference. But with regard to them, there have been established the principles, 1st, of prevention, and 2d, when this fails, of simply conducting them to a favourable termination. It appears to me that the same rule ought to hold with regard to internal inflammations, and that this will be admitted when it is made apparent, not only that every inflammation once formed runs through a definite course, but what that course is. This I now proceed shortly to consider.

If, then, we watch the natural progress of inflammation in any of the textures of the body, we observe that it terminates in two ways, viz., 1st, by vital changes of growth of different kinds in the exudation, constituting what has hitherto been called suppuration, adhesion, granulation, cicatrization, the healing processes, etc. etc.; and, 2dly, by death of the exudation, which, if rapid, putrefies, producing gangrene, or, if slow, disintegrates, causing ulceration. (See p. 133, *et seq.*) The first series of changes are not destructive, but formative and reparative. Suppuration especially should be looked upon as a kind of growth, which enables the exuded and coagulated blood-plasma to be rapidly broken up, and eliminated from the economy. If so, instead of being checked, it should be encouraged as much as possible. A very different doctrine from what has hitherto prevailed. Again, every thing that lowers the vital strength and weakens the economy, must impede the nutritive processes of growth, and tend more or less to a slow or rapid death of the exudation. Blood-letting especially has this tendency, and must therefore be wholly opposed to the rapid disappearance of inflammation; for example:—

If a bone be fractured, inflammation occurs around the injured part, and exudation is poured out, which undergoes vital changes, whereby ultimately it is transformed into bone. If soft parts are destroyed or removed, the exudation poured out from the injured vessels undergoes other vital changes, whereby it is transformed into fibrous tissue, constituting first granulations, and then a cicatrix. After subcutaneous section of tendon, with separation of its extremities, the transformation is more perfect, producing, as in the case of bone, a growth exactly similar to the one which was injured. If a violent blow or injury has been received, a greater or less amount of exudation is infiltrated among the contused and torn tissues, which is transformed by cell growth into pus, which, if it can be evacuated externally, is soon got rid of, but if not, is on the disintegration of the cells absorbed and excreted from the economy. If, under other circumstances, the pus is absorbed as rapidly as it is formed, the inflammatory swelling is said to be resolved or discussed; if not, it collects in the form of a fluid to constitute an abscess. Surely it cannot be maintained that, in any of these cases, we can favour these reparative processes by blood-letting and lowering the strength of the economy. On the contrary, they have always been found to be best perfected in individuals of vigorous constitutions, whilst in scrofulous or broken-down and weak persons, they proceed slowly or not at all.

But in internal inflammations, say of the lungs or pericardium, are the processes different? Certainly not. In the one case the exudation is converted into pus cells and absorbed, and in the other into fibrous texture, causing adhesions. But because these processes have been hid from view, physicians have supposed that, instead of treating the inflamed parts as the surgeon does, he ought to attack the general symptoms which result from the lesion. In cases of fracture and contusion, there are also febrile symptoms, increased pulse, and so on. But does the surgeon imagine that callus will form better, or his abscess be resolved, or reach maturity sooner, by general blood-letting and antiphlogistics? Experience teaches him otherwise, and in the same manner it is certain that such treatment does not favour the natural termination of internal inflammations.

It may be well, however, in further proof of this, to point out a little more particularly what are the changes which a pneumonia and a pericarditis do go through, as illustrative of the proposition we seek to establish.

In pneumonia the exudation is infiltrated into the air vesicles and minute bronchi, and between the fibres, blood-vessels, and nerves of the parenchyma, imprisoning the whole in a soft mass, which coagulates and renders the spongy texture of the lung more dense and heavy, or what is called hepatized. This accomplished, no air can enter, the circulation in the part is arrested and the nerves compressed, and the object of nature is now to reconvert the solid exudation once again into a fluid, whereby it can be partly evacuated from the bronchi, but principally reabsorbed into the blood, and excreted from the economy. This is accomplished by cell-growth. In the amorphous coagulated exudation, granules are formed, around groups of these cell-walls are produced, and gradually the solid amorphous mass is converted into a fluid crowded with cells. This is pus. The cells after passing through their natural life, die and break down, whereby the exudation is again reduced to a condition susceptible of absorption through the vascular walls, and once more mingles with the blood, but in an altered chemical condition. In the blood the changed exudation (now called fibrin) undergoes further chemical metamorphoses, whereby, according to Liebig, it is converted by means of oxygen into urate of ammonia, choleic acid, sulphur, phosphorus, and phosphate of lime. The urate of ammonia, by the further action of oxygen, is converted into urea and carbonic acid; the choleic acid into carbonic acid

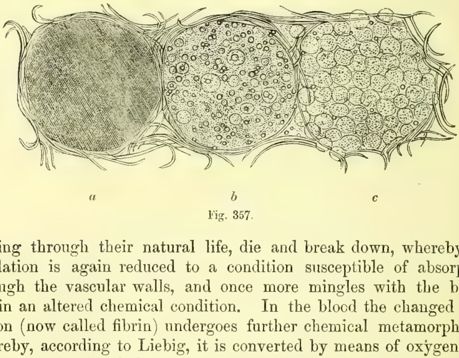

Fig. 357.

Fig. 357. Three air vesicles of a pneumonic lung, filled with exudation in different stages of development. *a*, Molecular exudation recently poured out; *b*, cells forming in the exudation; *c*, cells (pus cells) fully formed. See case of Alexander Walker among Diseases of the Nervous System.

and carbonate of ammonia; the sulphur and phosphorus into sulphuric and phosphoric acids, which combining with an alkali or earth, form sulphates and phosphates. If it should happen that the quantity of oxygen taken is not sufficient completely to accomplish this cycle of changes, then, instead of urea, either urate of ammonia appears in the urine, or if the ammonia have entered into any other combinations, pure crystals of uric acid or fibrin. In consequence of these or similar changes, the exudation is finally removed from the economy.

In a pleurisy or a pericarditis, the transformations occurring in the exudation are different. Let us follow them in the case of pericarditis. When a severe inflammation of the pericardium occurs, the liquor sanguinis is exuded in considerable quantity, separating the serous layers to a greater or less extent. After a time the fibrin coagulates and forms a layer which attaches itself to the membrane, whilst the serum of the blood accumulates in the centre. The coagulated fibrin at first assumes the form of molecular fibres, plastic or pyoid cells are formed in it, (Fig. 94), others throw out prolongations, so as by their union to form a plexus, which, communicating with the vessels below the serous membrane, renders the exudation vascular. (Fig. 225). Gradually the surface assumes the appearance of a villous membrane, (Fig. 358), as well as the absorbent functions of one. The enlarged villi frequently contain vacuoles or spaces, reminding me strongly of the general structure of the placental tufts, than which nothing can be imagined more perfectly adapted for the purposes

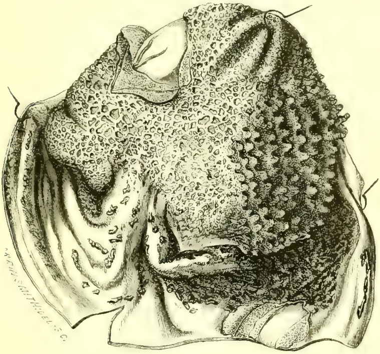

Fig. 358.

Fig. 358. Layers of lymph in pericarditis, presenting the form of large villi.—(*Cruveilhier.*)

of absorption. (Fig. 359.) In consequence, the serum now disappears, the two false membranes are brought into contact, and thus absorption, as soon as it is no longer required, is put an end to, and adhesion occurs. The matters absorbed into the blood pass through the same series of changes as those in pneumonia do, and are eliminated from the economy in a similar manner. Such is the natural progress of pericarditis.

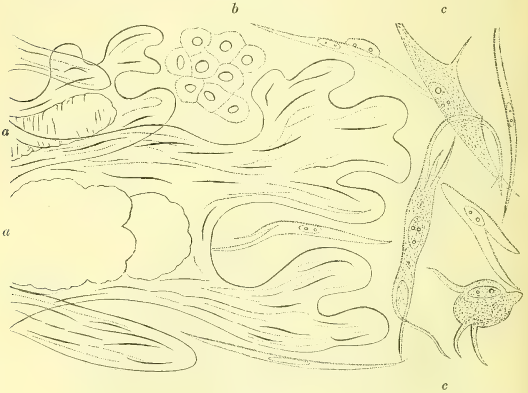

Fig. 359.

The two kinds of processes now described exhibit the same wise design in pathological as we everywhere find in physiological actions. In the vascular tissue of the lung, new blood-vessels are unnecessary. But in the non-vascular serous membrane, they must be formed to bring about removal of the morbid products. In the one case the entire exudation is transformed into cells, to produce rapid disintegration and absorption, which latter is easily accomplished by the already formed numerous vessels of the lung. In the other case the exuded liquor sanguinis is separated into solid and fluid parts, and as there are no vessels in the serous membrane, they are formed in one portion of the exudation to cause absorption of the other.

During the progress of these essentially vital acts and modes of

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Fig. 359. Structure of the villi in pericarditis. On the left of the figure are some villi treated with acetic acid, and thereby rendered very transparent, showing the elongated nuclei of the fibre cells of which they are principally composed. *a*, The vacuoles or spaces common in these villi; *b*, group of epithelial cells which in many places covered the villi; *c*, cells of various shapes, easily squeezed from the soft villous structure, undergoing the fibrous and vascular transformations.—(See Fig. 225). 200 *diam.*

growth and formation, how can it be supposed that lowering the strength by blood-letting can influence them in any way except for the worse; that is to say, weakening that power on which the transformations depend? Dr. Alison admits that "it is not merely the mechanical change of position of many particles of the blood, but a strictly vital action, such as we trace up only to principles of physiology and pathology, to which we have to apply a remedy." The nature of this vital action he has not sought to explain. But, if, as we have pointed out, it is essentially a formative one, and in kind identical with growth in young tissues, it ought not to be diminished or destroyed by depleting remedies.

But, says Dr. Alison, if we abandon blood-letting, as recommended by so many practical authors in obedience to this doctrine, "we shall be trusting to a pathological view of a vital process, still very imperfectly known, in opposition to a therapeutical principle, founded no doubt on empirical observation only; requiring no doubt, as all powerful remedies do, an exercise of judgment of the practitioners in applying it; because it may easily do harm by enfeebling, and at the same time rendering more irritable, all the vital actions involved in the disease, more than good, by restraining the amount of the exudation; but, nevertheless, much more to be depended on, *as guiding practice in these circumstances*, than any principle in pathology." If, however, instead of being imperfectly known, as is supposed, it should turn out that the pathological view I am contending for is true, and is extensively known among the younger members of the profession, then the admission here made by Dr. Alison of how easily blood-letting may do harm and enfeeble, may be expected to produce an effect prejudicial to its employment. Besides, the moment a pathological law can be successfully established, empirical rules are overthrown. Dr. Alison, who has done so much in attempting to establish the supremacy of vital laws, is too good a logician not to know this. Hence his objection is directed against the uncertainty and want of general information of the theoretical view as a guide to practice, when compared with the advantages which he considers the empirical rule has produced, as tested by past experience. This, then, leads me to abandon pathological research and deduction, and inquire how far actual facts indicate which is the best practice—blood-letting in obedience to empirical rules, or abstaining from it, in accordance with the pathological principles now brought forward.

PROPOSITION 5.—*That all positive knowledge of the experience of the past, as well as the more exact observations of the present day, alike establish the truth of the preceding principles as guides for the future.*

In endeavouring to determine from experience what is the value of bleeding in acute inflammations, it must be remembered that, whilst past experience has declared it to be the *sine qua non*, the *summum remedium*, the only certain means of cutting short the disease, and so on—present experience declares by almost universal consent that now-a-days individuals labouring under them recover rapidly without bleeding at all. This admission constitutes the basis of the theory advanced by Dr. Alison, viz., that acute inflammations within the last twenty years have changed their type. So that the question now is not whether no bleeding is good practice, but how the admission of this fact is to be reconciled with the experience of twenty years ago. But inasmuch as for the reasons previously given we cannot suppose for a moment that inflammation has ever undergone any change whatever among mankind, it necessarily follows, if modern practice in this matter be correct, that former bleedings must have been inert or injurious.

Before it is possible, however, to determine with exactitude the value of any practice, it is essential to ascertain the natural duration of the disease we propose to treat. Fortunately we have now some data which will enable us to arrive at this information with regard to one of the most frequent and important kinds of inflammation known to us, viz., pneumonia. Very severe cases of this disease were observed by Dr. George Balfour of Cramond, in the Homœopathic Hospital of Vienna, under a treatment that no reasonable medical man can suppose to be anything else than inert. Yet most of these cases got well, and may be considered as excellent studies of the disease left entirely to nature.* We have also the accounts of the expectant systems of treating this disease in Vienna under Skoda† and Dietl.‡

From all the accounts which have been published concerning the natural progress of a pneumonia, it would appear that very slight cases (that is, where the inflammation has been limited) may be convalescent on the seventh day, that the majority of cases of medium intensity recover between the seventh and fourteenth days, and very severe ones between the fourteenth and twenty-first days. It is sometimes difficult to judge from the accounts of different authors what according to them constitutes the number of days an individual is affected. Some suppose that disappearance of fever or cessation of pain marks recovery. Others have declared convalescence to be established as soon as the patient can take a little beef tea. I have ventured, however, to name periods between the seventh, fourteenth, and twenty-first days, from a careful examination of the cases themselves, and from applying to them the rules which have governed the records of my own practice. These are to consider the commencement of the disease as indicated by the rigor, and the termination as indicated by marked diminution in the physical signs conjoined with disappearance of the leading symptoms,—I say marked diminution, because a certain amount of increased vocal resonance and even crepitation, not unfrequently continues for some time after the individual has left his bed and has to all intents and purposes perfectly recovered. Such, it appears to me, is the average duration of pneumonia, and I believe that if an individual can be shown to have recovered from an attack of the disease which has involved, say two-thirds of one lung in fourteen days, it is a good recovery, and yet only consistent with the natural progress of the disease in sound constitutions.

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* Brit. and For. Medical Review, vols. 22 and 23.

† Dr. G. Balfour in Edin. Med. and Surg. Journal. 1847.

‡ Der Aderlass in der Lungenentzündung. Wien. 1849.

Here it is important to consider that the violence of the symptoms bears no necessary relation to the extent or intensity of the disease. Some persons present great fever and constitutional disturbance when one lung is only slightly involved, and recover rapidly; whereas others may have an entire lung inflamed, or portions of both lungs, and exhibit comparatively trifling fever and few marked symptoms, until impeded respiration occurs, ushering in death. It is a knowledge of this important fact which serves to clear up much of the discrepancy existing between past and present practice, especially when conjoined with another, viz., that however bleeding may relieve symptoms, it has no influence in shortening the duration or diminishing the extent of the disease. Of this fact the observations of Louis, Grisolle, and Alison can leave us in no doubt; and I have frequently satisfied myself of their correctness. It follows that, as the past race of practitioners considered pneumonia only demonstrable by symptoms, which furnished the sole evidence of the advantage of bleeding, that as soon as these symptoms were diminished by venesection, they thought benefit was accomplished. Whereas now it has become apparent that such is no certain evidence of recovery from the disease, which may linger notwithstanding for weeks, give rise to a tedious convalescence, and even induce death by exhaustion after active functional symptoms have for the most part disappeared.

The real tests of successful practice, therefore, are not to be sought for in the relief of symptoms, but in the removal of the disease; and that treatment will be best which, *cœteris paribus*, causes fewest deaths, and recovery in the shortest time. Let us then look at the results, 1st, of the antiphlogistic treatment as formerly practised by bleedings and tartar emetic; 2d, of the expectant system, or what ought to be called a dietetic system; 3d, of the treatment directed to further the natural progress of the disease as I have explained it.

Treatment by Bleeding.—It appears from the published statistics of the Royal Infirmary of Edinburgh, that upwards of one-third of all the patients affected with pneumonia, who entered during a period of ten years, died. No doubt it cannot be pretended that perfect accuracy as to diagnosis was attained in all the cases. It is certain also that numerous complications and the debilitated constitutions so frequently met with in the practice of a large hospital, served to swell the mortality. It is remarkable, however, that this proportion of deaths to recoveries is nearly the same as has occurred in the Infirmary since the commencement of the present century, as well as what resulted in the cases so carefully observed by M. Louis, in the hospital of La Charité, at Paris.

TABLE showing the number of patients affected with pneumonia treated in the Royal Infirmary of Edinburgh, and the results, from July 1st 1839 to October 1st 1849 :—

Total No. of Patients entering the Infirmary.	Years.	No. admitted.	Cured.	Relieved.	Died.	Statistician.
7,969*	1st July 1839 to 1st Oct. 1841	139	85	5	49	Dr. John Reid.
3,537	1st Oct. 1841 to 1st July 1842	42	23	3	16	Dr. T. Peacock.
2,760	„ 1842 „ 1843	41	26	0	15	
7,204*	„ 1843 „ 1844	31	16	4	11	Dr. Hughes Bennett.
3,252	„ 1844 „ 1845	50	33	4	13	
3,638	„ 1845 „ 1846	61	40	6	15	
7,435*	„ 1846 „ 1847	93	47	5	41	
7,446*	„ 1847 „ 1848	103	52	6	45	
3,724†	„ 1848 „ 1849	88	66	5	17	Mr. M'Dougall.
46,965		648	388	38	222	

My late resident clerk, Dr. Thorburn, was kind enough, at my request, to go over 208 case-books of the Infirmary, dated between the years 1812 and 1837, and belonging to twelve physicians, all of whom practised an antiphlogistic treatment. He found that of 103 cases of pneumonia, 55 were cured, 41 died, and 7 were relieved. Dr. Thorburn then carefully read over these 103 cases, and rejected all those that were incomplete, or which presented no evidence of having been pneumonia. The remainder were tabulated, and it may safely be said that they were all cases of pneumonia, or of acute inflammations of the chest closely allied to that disease, and the result was :—Number of cases, 50; died, 19; cured or relieved, 31.

The total number of cases, recorded by M. Louis, was 107.‡ Of these 32 died, or 1 in $3\frac{1}{3}$. In 78 of those cases which occurred at La Charité, bleeding was performed, from the first to the ninth day, and the deaths were 28, or 1 in $3\frac{1}{7}$. The duration of the disease in the cases which recovered, was $15\frac{1}{2}$ days. Of the remaining 29 cases, which occurred at La Pitié, the bleeding was performed earlier, that is, during the first 4 days, and of these only 4 died, that is, 1 in $7\frac{1}{4}$. The duration of the disease, however, in the cases that recovered, was $18\frac{1}{4}$ days. This diminished mortality, but greater length of recovery, M.

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* At these periods there were great epidemics of fever.

† At this period considerable changes took place among the medical staff of the Infirmary.

‡ Recherches sur les effets de la Saignée. Paris. 1835.

Louis attributes to the bleedings not having been so large, and the greater amount of tartar emetic employed. Hence, the proposition he sought to establish, that although bleeding has a very limited influence on pneumonia, it should be practised early. With regard to M. Louis's results, it should be remembered, that all these patients enjoyed excellent health when they were attacked, and that the duration of the disease was estimated from the occurrence of febrile symptoms, up to the time when light food could be taken, which was generally three days after the fever had ceased.

That the result of an active antiphlogistic treatment was the production of a mortality of about 1 in 3 cases, seems to me further established by the account of Rasori,* who, in the great hospital of Milan, treated 648 cases by large doses of tartar emetic, of which 555 were cured, and 143 died, that is, 1 in 4½. In publishing this statement, Rasori gives the result as one more favourable than the practice of blood-letting, which of course he would not have done unless the latter treatment was well-known to have been attended with a greater mortality than that by tartar emetic, or 1 death in 4½ cases.

M. Grisolle† advocated more moderate bleedings than those so frequently had recourse to, his conscience preventing the abandonment of venesection altogether (p. 561). He analyses the 75 cases of Bouillaud, pointing out that only 49 were treated by the *coup sur coup* mode of bleeding, of which 6 died, or 1 in 8 cases, a favourable result, which he attributes to the youth of the patients treated. Of his own cases, one group of 50 cases were bled only in the first stage of the disease; of these 5 died, or 1 in 10. Those cases that died were bled most, each losing about 4 lb. 4 oz. of blood in successive bleedings. All the cases in this group were uncomplicated, and of the average age of 40 years. Of 182 cases that were bled in the second stage, 32 died, or more than 1 in 6. Here also those who died were bled most. Of the whole 232 cases, 37 died, that is about 1 in 6⅓, as the general result of M. Grisolle's hospital practice, a mortality only one-half that of M. Louis's cases, although the circumstances under which they occurred were the same, with the exception of not being so heroically treated. Laennec also, who only bled moderately at the commencement of the disease, regarded the mortality to be 1 death in 6 or 8 cases.‡

Dr. Glen, my present resident clerk, was so good as to tabulate for me all the cases of pneumonia given in the army returns, and reported by Colonel Tulloch.§ Nothing can be more unsatisfactory than the nature of these returns, as we have no information as to the exactitude with which they were made, how the diagnosis was determined, or what was the treatment. The favourable mortality, as it has been supposed, of 1 death in 13 cases, which, according to Dr. Glen, is the general result, is of little or no service to the present inquiry.

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* From an Analysis of Rasori's Practice—Annales de Therapeutique. Janvier. 1847.

† Traité pratique de la Pneumonie. Paris. 1841.

‡ Forbes' Translation. Fourth Edition. P. 237.

§ Government Statistical Reports on Mortality among the Troops. 1853.

Treatment by Diet.—This treatment essentially consists in allowing the disease to go through its natural course. During the stage of fever the diet is light, and cold water allowed for drink; subsequently more generous diet is allowed, with wine, according to the nature of the symptoms. Sometimes a dietetic is converted into an *expectant treatment*, when remedies are given to meet occasional symptoms, as in the practice of Skoda, in the Charity Hospital of Vienna. An account of this has been given to us by Dr. George Balfour of Cramond, who found from the books of the hospital, that during a period of three years and five months, commencing 1843, 392 patients were treated, of whom 54 died, or 1 in 7¼. Occasionally opium was given in small doses if there was much pain. Venesection was also practised early if there was much dyspnœa, and emetics given if the expectoration consisted of tough mucus.

Dr. Balfour has also given some statistics of the Homœopathic Hospital of Vienna, accompanied, however, with statements which render it doubtful whether every case that applied was admitted, and consequently not fairly comparable with other hospital statistics. There can be no doubt, however, that many severe cases of pneumonia recovered under a system of treatment, which, it appears to me, most medical men must consider to be essentially a dietetic one.

Dr. Dietl treated 380 cases of primary pneumonia, in the Charity Hospital of Vienna; 85 by venesection, 106 by large doses of tartar emetic, and 189 by diet only, with the following result:—

	Venesection.	Tartar Emetic.	Diet.
Cured	68	84	175
Died	17	22	14
	85	106	189
Per cent	20.4	20.7	7.4
Deaths	1 in 5	1 in 5.22	1 in 13½

It was further observable that of the 85 cases treated by blood-letting, 7 of the fatal cases were uncomplicated; whilst of the 189 cases treated by diet, not one of the deaths was an uncomplicated one.

Treatment directed to further the natural progress of the disease.—The treatment I have pursued in pneumonia is founded on the pathological principles formerly given, viz., never to attempt cutting the disease short, or to weaken the pulse and vital powers, but on the contrary to further the necessary changes which the exudation must undergo, in order to be fully excreted from the economy. To this end, during the period of febrile excitement, I content myself with giving salines in small doses, with a view of diminishing the viscosity of the blood. As soon as the pulse becomes soft, I order good beef tea and nutrients; and if there be weakness, from 4 to 8 ounces of wine daily. As the period of crisis approaches I give a diuretic, generally consisting of ʒss of nitric æther, sometimes combined with Mx of colchicum wine, three times daily, to favour the excretion of urates. But if crisis occurs by sweat or stool, I take care not to check it in any way.

On examining into the results of this practice, which has been publicly carried on by me in the clinical wards of the Royal Infirmary during the last eight years, and which has been carefully recorded by the clinical clerks, I find the total number of cases to be 65; the average age 31 years.

Of these, 62 were dismissed cured, and 3 died; that is, one in 21⅔.

Of the 62 cases cured, 55 were uncomplicated, and 7 complicated. Of the 55 uncomplicated cases, I find that the clerk has omitted to state either the exact day of rigor, or of convalesence in 4, so that no deduction can be derived from them as to the duration of the disease. But of the remaining 51 uncomplicated cases, 40 were single and 11 double pneumonias.

The duration of the 40 cases of single pneumonia was as follows, viz.—3 cases recovered in 7 days; 2 cases in 8 days; 4 cases in 10 days; 1 case in 11 days; 3 cases in 12 days; 2 cases in 13 days; 9 cases in 14 days; 1 case in 15 days; 3 cases in 16 days; 2 cases in 17 days; 3 cases in 18 days; 1 case in 19 days; 1 case in 20 days; 2 cases in 21 days; 1 case in 22 days; 1 case in 23 days; and 1 case in 26 days. Average duration of single uncomplicated pneumonias, 14½ days.

The duration of the 11 cases of double pneumonia were as follows—1 case recovered in 13 days; 2 cases in 14 days; 1 case in 16 days; 2 cases in 18 days; 1 case in 20 days; 3 cases in 21 days; and 1 case in 55 days. Average duration of double uncomplicated pneumonias 21 days.

Of the 55 uncomplicated cases, 6 were bled and were subjected to an antiphlogistic treatment before admission. Of these 1 case recovered in 7 days; 2 cases in 14 days; 1 case in 16 days; 1 case in 17 days; and 1 case (a severe double one) in 55 days. Average duration of cases bled 20½ days.

Of the 7 complicated cases of pneumonia which recovered, 1 case supervened on chronic asthma, bronchitis, and emphysema, and recovered in 14 days; 1 case supervened on typhus fever, and recovered in 16 days; 1 case supervened on chronic asthma, bronchitis, and pleurisy, and recovered in 48 days; 1 case supervened on typhus fever, and recovered in 18 days; 1 case supervened on pleurisy on one side, with pleural exudation existing 8 weeks before admission, and recovered in 19 days; 1 case supervened on rheumatism with heart disease and recovered in 19 days; and 1 case supervened on very severe rheumatism, with endocarditis and pericarditis, but recovered in 15 days. The average duration of the pneumonia in the seven complicated cases was $21\frac{1}{3}$ days.

The three fatal cases were all complicated. The first, with uncontrollable diarrhœa, and on dissection conjoined with pneumonia there was found extensive follicular disease of the mucous membrane of the duodenum, jejunum, but chiefly of the ileum. The second case was complicated with persistent albuminuria and anasarca. No *post-mortem* examination could be obtained. The third case, that of a drunkard, was complicated with delirium tremens, and latterly violent convulsions. On dissection, in addition to the pneumonia, there was found universal cerebral meningitis, with exudation, at the base, as well as over both hemispheres of the brain.

In addition to the three fatal cases here recorded, I have found in the pathological registers kept by Drs. Gairdner and Haldane seven other cases, in which as the result of chronic, cerebral, cardiac, renal, or other pulmonary disease (such as phthisis), pneumonia appeared before death, adding a fatal complication to previously existing maladies. Not one of these can properly be considered as a case of acute pneumonia, or indeed of pneumonia at all. They have all been entered by the clerks in the ward books as softening of the brain, morbus cordis, Bright's disease, or other lesion for which the patients entered the Infirmary and were treated. In most of them it was the *pneumonie des agonizans* of the French.

These, then, are positively all the cases of acute pneumonia which have entered the Infirmary under my care during the last eight years, so far as I can discover them. Last winter I read through, analysed, and tabulated them myself. During the recent Christmas vacation I again went over them with Dr. Glen, my present clinical resident physician, to whom I am much indebted for the great care and pains he has taken in confirming these results. Every case has been treated publicly and is open for inspection in the ward books, and the result is as I have stated, that the mortality of the acute pneumonias, in the practice of the clinical wards while under my care, is 1 in $21\frac{2}{3}$, and that of all the cases of uncomplicated pneumonia, 55 in number, not one has died, although many of them have been very severe, involving the whole of one lung, and in 11 cases portions of both lungs.

So far, I think, I approach very near correctness by saying that the result of a vigorous antiphlogistic treatment of pneumonia as formerly practised, is a mortality of 1 in 3 cases; that the result of a treatment by tartar emetic in large doses, according to Rasori, and more recently to Dietl, is a mortality of 1 in 5 cases—but according to Laennec, 1 in 10 cases; that the result of moderate bleedings, as in the treatment of Grisolle, is a mortality of 1 in 6½ cases; and that the result of a dietetic treatment with occasional bleedings and emetics in severe cases, as with Skoda, is a mortality of 1 in 7, and if pure, as under Dietl, a mortality of 1 in 13 cases, all carried on in large public hospitals. Further, that the mortality from pneumonia in the army and navy, occurring generally among healthy able-bodied men, has been also a mortality of 1 in 13 cases. Lastly, that the result of a treatment directed to further the natural progress of the disease as I have explained it, is, in the clinical wards of the Royal Infirmary of Edinburgh, when under my care, up to this time a mortality of 1 in 21⅔ cases.

From these facts it follows that uncomplicated pneumonias, especially in young and vigorous constitutions, almost always get well, if instead of lowering, the vital powers are supported, and the excretion of effete products assisted. It is exactly in these cases, however, that we were formerly enjoined to bleed most copiously, and that our systematic works even now direct us to draw blood largely and repeatedly in consequence of the supposed imminent danger of suppuration destroying the texture of the lung. Such danger is altogether illusory, and the destruction to lung tissue, so far from being avoided, is far more likely to be produced by the practice. In fact, the only cases in which it occurs are in aged or enfeebled constitutions, in which nutrients and not antiphlogistics are the remedies indicated. We can, however, readily understand how blood-letting, practised early and in young and vigorous constitutions, does less harm, or, to use a common expression, "is borne better," than when the disease is advanced or the patient weak, and this, because then the vital powers are less affected by it. Hence the diminished mortality in the second series of Louis's cases, and probably in the army and navy cases. But that it cures the greater number of persons attacked, or shortens the duration of the disease, is disproved by every fact with which we are acquainted.

At the same time there are cases, which were formerly often mistaken for inflammation, in which blood-letting may still be useful. I allude to those where an obstruction to the circulation exists in the heart and lung dependent on over-distension of the right side of the former organ, and cases of venous congestion, engorgement, and perhaps œdema of the latter; also certain cases of bronchitis preventing aeration, of aneurisms, and of asphyxia. Although even here the true value of the remedy has yet to be positively ascertained, the special cases demanding it more carefully discriminated, and the mechanical principles which justify the practice determined. The temporary benefit occasioned in many of these cases by the loss of a trifling amount of blood is often very remarkable, and has been previously referred to (p. 274). I have seen instances where great dyspnœa and pain, caused by large thoracic aneurisms in vigorous men, have been greatly alleviated, and inexpressible relief produced for from twelve to twenty-four hours, by a bleeding to the extent of only five ounces. It seems probable that this may arise from diminishing for a time the tension of the whole vascular system. But whatever be the explanation of this fact, I hold that, as a palliative, and practised to a limited extent in cases where no great debility exists, blood-letting may still be had recourse to. So with regard to antimonials, although in the large doses, which weaken the heart and force of the pulse, they are not serviceable—in smaller doses, together with other neutral salts, they may assist in diminishing the viscosity of the blood, and in favouring the excretion of the effete matters by the skin and kidneys.

As to mercurials, the confident belief in their power of causing absorption of lymph, by operating on the blood, is not only opposed to sound theory, as formerly explained, but, like blood-letting, is not supported by that experience which has been so confidently appealed to in their favour. They have been most praised in the treatment of serous inflammations and in iritis. But recent careful observation has demonstrated that the moment these diseases are treated without mercury, they are uninfluenced (except in certain cases for the worse) by this drug. Thus, from an analysis of 40 cases of pericarditis, recorded with unusual care by the late Dr. John Taylor, only 4 appear even coincidently to have benefited in any way.* And of 64 cases of iritis, of every degree of severity, including its idiopathic, traumatic, rheumatic, and syphilitic varieties, treated without mercury, by Dr. H. W. Williams of Boston, U.S., the results—with four exceptions, which were neglected at the commencement—were perfectly good.†

I cannot, therefore, resist the conclusion that the principles which led to an antiphlogistic practice in acute inflammations were erroneous, and are no longer in harmony with the existing state of pathology. I think it has been further shown that in recent times our success in treatment has been great, just in proportion as we have abandoned heroic remedies, and directed our attention to furthering the natural progress of the disease. Thus in our large public hospitals, under circumstances pretty much the same, it has been shown that the mortality of pneumonia has been diminished from 1 in 3 to 1 in 7 cases, then to 1 in 13, and lastly, to 1 in 21⅔ cases. In other words, death from this disease takes place seven times less frequently now than it did twenty years ago. I am satisfied also that deaths from acute pericarditis are far less common now than formerly, and that post-mortem examinations as a consequence demonstrate adhesions of the pericardium much more frequently. This great improvement in practice, it appears to me, is attributable—1*st*, To the greater accuracy with which we can now detect inflammations of the lung; and 2*d*, To our better acquaintance with their pathology—and the result is not the less certain with men of experience, because these causes operate insensibly to themselves. How often, during the last sixteen years, have we been asked, of what use are your stethoscopes, your microscopes, and your chemical analyses at the bed-side? In reply we point to the revolution now going on in the practice of medicine, to the establishment of scientific laws instead of empirical rules, and to the abandonment of a palliative in favour of a curative plan of treatment.*

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* British and Foreign Medical Review, vol. xxiv. p. 565; and Lancet, May 1845 to October 1846.

† Boston Medical and Surgical Journal. 1856.

THE INFLUENCE OF PREDOMINANT IDEAS ON THE HEALTHY AND DISORDERED FUNCTIONS OF THE BODY.

Dr. Henry Monro,† speaking of Monomania, says that "in these cases neither the controlling agency of the will nor the reason is suspended on most subjects, though it is so on certain points; these people can guide their thoughts well enough on most questions, can see the full relations that cause bears to effect, and that mental impressions bear to external things, but they cannot properly control those impressions which are most strongly fixed on the mind. This state has very frequently a stage of contest and conscious difficulty at first, when the struggle between the morbid impressions and the faculties by which to control them is great; indeed, we may say that all morbid and excessive impressions which exclude all other considerations bear the rudimentary form of this affection, though insanity cannot be said strictly to be fully developed until the contest is decided by such a victory on the part of the morbid impressions that the moral liberty to exercise their reasoning faculties on these subjects is gone."

Now, the first stage of the process here so accurately described, viz., that in which certain persons cannot control those impressions which are most strongly fixed on the mind,—may be produced artificially in about one out of twenty individuals of the entire population. Thus, if that number of persons be chosen indiscriminately, and directed to gaze steadily at any object for about ten minutes, a peculiar condition of the cerebral functions is produced in one or more (especially if they be young), in which those affected may be made, not only to act upon any train of ideas which may be suggested to them, but motion and sensation may be influenced in a variety of ways.‡ It seems as if the mental faculties were fatigued, in consequence of which they lose the power of controlling any idea that becomes predominant.

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* Whilst these pages are going through the press, the subject now treated of has been discussed at several meetings of the Edinburgh Medico-Chirurgical Society, and in the pages of the Edinburgh Medical Journal. Should any new facts or views be elicited, they will be noticed in the form of an Appendix at the end of the work.

† Remarks on Insanity, &c. 1851.

‡ The mode of producing this condition may be varied, but it is in all cases essentially the same. Thus Mesmer caused individuals to sit in a kind of trough, and they were directed to look at a wire placed in their hand. The Fakirs of India throw themselves into a trance by looking at the extremity of their own noses. Mr. Braid of Manchester holds an object a little above the eyes, so as to fatigue them sooner. Dr. Darling

The peculiar mental condition thus produced manifests itself while the individual is gazing upon the object, in the first instance, by a mistiness of vision, succeeded in some by a feeling of lassitude and desire to sleep, in others only by stiffness of the eyelids, and in a third class by deep-drawn sighs, hurried respiration, heaving of the chest, or other signs of general excitement. If now such persons are repeatedly told in a confident manner that they cannot open their eyes, it will be found that they cannot do so, especially if their attention be more strongly directed to the eyelids by touching or pointing to them. But on receiving permission, or on being commanded to open them, this is done at once.

In the same manner, an individual so affected may be made to make every conceivable kind of motion against his will, or, on the other hand, such movements as he may wish to make can be impeded, arrested, or perverted. Thus I have seen a person unable to speak, from inability to open the jaws; not able to bend an arm or a leg; fixed to a chair, or prevented from sitting down; unable to approach a particular object, or irresistibly impelled towards it; unable to cross a real or imaginary line on the floor; the arm suspended and fixed in the act of drinking, or the body arrested in the act of dancing; the individual made to walk, dance, or run, as directed; to imitate riding on horseback, when seated on a chair; or to stagger about the room in a supposed state of intoxication, etc. Many of the lower animals also appear to be susceptible of being impressed by what strongly arrests their attention, in such a way that they are rendered incapable of voluntary motion, or irresistibly impelled towards the object. Hence the long glittering bodies of serpents, or the glaring eyes of other animals, *fascinate* birds and small quadrupeds, and render them an easy prey to their enemies. Similar effects are produced in individuals who look from heights and precipices, and experience an uncontrollable desire to leap down, although it be to certain destruction.

In like manner, during this condition all the sensations may be increased, perverted, or destroyed, through the medium of suggestive ideas communicated to the mind. By fixing attention on any part of the skin it may be made to feel hot or cold, tingling and painful, or benumbed and destitute of sensibility, according to the ideas communicated. Sight may be lost or rendered painful, spectral images may be presented to the vision, or various objects made to resemble others to which they bear no analogy. Smell also may be perverted, and any kind of odour given to inodorous substances. A rose, in the mind of such an individual, may have the smell of an onion, and plain water the fragrance of *eau de Cologne*. Various noises, in like manner, may

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causes them to look at a small coin placed in the palms of their hands, whilst others fix the attention of persons on themselves, on the tips of their fingers extended towards their eyes, and make motions or so-called passes which arrest the attention.

be heard; hearing is frequently very acute, at other times it is apparently abolished. Lastly, the taste may be affected, and plain water made to present to such a person the sweetness of honey, the bitterness of wormwood, or the acidity of vinegar.

Then, as regards the mental faculties, memory may be lost, whilst judgment and comparison for the time being cannot be exercised. The imaginative faculties, on the other hand, are very vivid, so that the individual readily assumes the manners of other persons in various walks of life—goes through the operations of different mechanical trades, conceiving himself to be an artisan—endeavours to escape from imaginary dangers or tries to repel them—and acts as he himself or others might be supposed to do under any given circumstances or conditions. Thus he may be made to fight, to swim, to run, to stagger as if intoxicated, and so on. Even the sex may in this manner be mentally changed, and a lady may assume the manners, tone of voice, and language of her husband. Such persons also may readily be conducted in imagination to various distant countries or cities, when they will act and talk as if they were really there; or they may be conducted through a very complicated series of actions, such as a quarrel terminating in a duel; a fishing or shooting excursion in which they catch numerous fish, or bag a quantity of game, etc. etc.

In the same way sleep is most readily induced, and may be made so sound that all ordinary stimuli will not awake them, and occasionally sensation is for the time annihilated. Yet it often happens that at the command of him who has been communicating the suggestive ideas, they immediately awake from a condition of sopor from which local painful applications would not arouse them. Susceptible persons may be even commanded to sleep at a particular hour on a certain day, and awake at a particular time, and this they will do under the idea that at the hour named some peculiar influence is exerted on them. This condition is analogous to that of somnambulism, trance, or ecstasy, and presents all the intermediate gradations between these states and ordinary dreaming and reverie.

What is very curious in connection with many of these nervous aberrations, is, that a person may be perfectly conscious during the whole time of what he is doing, and even of the absurdity of the thing. He may know that the water he drinks is not milk or syrup, and yet he declares it to have the taste of those liquids. Frequently, when his motions are influenced, he evidently resists, but seems to be controlled by a will stronger than his own. He even laughs at his own ridiculous actions, but acknowledges his helplessness. The efforts at resistance only induce fatigue, and tend to render him more certainly the victim of the influence by which he is governed. This condition is certainly closely allied to the incipient stage of monomania. It should also be noticed that, although young and nervous persons are undoubtedly those who are most commonly affected, such is by no means always the case, as many individuals, apparently in good health and robust, have been made to exhibit all the phenomena described.

Such are only some of the phenomena which may be produced in those affected with the peculiar nervous condition which I am describing. They admit of infinite modifications, but the symptoms are all referable to increase, diminution, or perversion of intelligence, sensation, or voluntary motion, variously combined, according to the endless train of suggestive ideas that may be communicated to the individual.

Similar phenomena have occurred in all ages, produced in certain persons by predominant ideas, and variously modified according to the education, politics, or religion of the period. Thus the effects produced on many votaries during their initiation into the ancient mysteries; the ecstasies of the Pythian and other priestesses; the influence of religious enthusiasm; the dancing epidemics of St. Vitus, or of Tarantism, in the middle ages; the hallucinations of the Convulsionaires at the tomb of St. Medard, in Paris, etc. etc., are of a like character.* Numerous perversions of the nervous functions, identical in their nature with those described, consisting of sensory illusions, muscular convulsions or rigidity, and peculiar trains of thought influencing acts and conversation, may be found in the histories of witchcraft or demonology, in the legends of the saints, the journal of Mr. Wesley, and in the accounts given by travellers of the religious camp-meetings in the woods of America. They are perhaps more common now than previously, and excite even more astonishment among the ignorant, the only difference being that the same phenomena which in a dark age were attributed to divination or incantation now assume the garb of science, and are ascribed to Magnetism or Electricity.

I consider it unnecessary to enter into any lengthened argument to refute the numerous hypotheses which ascribe these effects to external influences. I know of no series of well-ascertained facts capable of supporting such a doctrine. Lately, I have tried numerous experiments with the aid of those who believe in Animal Magnetism, all of which have only convinced me that no such principle exists, and that all the phenomena really occasioned depend on suggestive ideas communicated to the person affected. But while these theories scarcely merit attention, the facts themselves are highly important, and demand the careful consideration of the physiologist and medical practitioner. Let us, then, examine into what can reasonably be advanced in explanation of these nervous phenomena.

We have seen that sensation may be defined to be *the consciousness of an impression*, and we know that the mind strongly intent upon an object is unconscious of those impressions which are going on around—so that no sensation results from these. Every physiologist is aware that the body of a decapitated animal may be thrown into violent convulsions, and cases have occurred even in man of the limbs having been thrown about, as if in the greatest agony, although in reality no pain whatever has been experienced. All-absorbing mental ideas prevent sensation of local impressions unconnected with them; hence wounds are not felt in battle, blows and falls are unheeded during the excitement of intoxication or of nitrous oxide gas, and Indian warriors and religious enthusiasts, intent on particular trains of thought, have not suffered from any of the supposed torments which were inflicted on their bodies. These facts, then, offer a sufficient explanation to the physiologist of the occasional insensibility of somnambulists, or others labouring under some predominant idea.

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* Hecker's Epidemics of the Middle Ages.

Whilst, however, an individual may be unconscious of impressions unconnected with his particular train of ideas, everything in relation to these is often perceived with extraordinary readiness. The abolition of sensation with regard to general impressions seems to be counterbalanced by an exquisite sensitiveness relative to the one impression either actually made or suggested. Dr. Holland has very ably pointed out the effects of mental attention on the bodily organs,* showing that there are few persons who do not experience irritation or some imaginary feeling in parts to which their attention is much directed. If at night, owing to some unusual position, we feel a beating at the heart or at the temples, we easily imagine there is something alarming; the respirations are altered, if we think about them; if we suppose the mouth is dry, we immediately swallow the saliva, and render it so; if we fancy we have a cough, we cough immediately, and clear the air passages; and if we suppose any source of irritation exists on the skin, we involuntarily apply our hand to and rub the part. Nothing is more common for medical students, when first studying individual diseases, than to imagine themselves to be the victims of each in succession. Then, in certain conditions of the system, it is well known that actual pain may be produced in a part by fixing our attention upon it. Hypochondriacs are martyrs to these erroneous impressions. Supposed pains in the limbs or stomach prevent their walking or eating, and their health suffers from want of exercise or want of food. Sir Benjamin Brodie has given some singular cases where so-called nervous pains of this description have actually led to tenderness and swelling of the integuments covering the part. It may easily be understood how facts of this kind may be made to assume the appearance of prophecy, and how informing a valetudinarian that he will certainly have a rheumatic or neuralgic pain on any given day, is likely to produce it.

As illustrative of the strong influence of predominant ideas even in healthy persons, I may mention the following circumstances:—Mr. Macfarlan, druggist, North Bridge, Edinburgh, informed me, that on one occasion a butcher was brought into his shop, from the market place opposite, labouring under a terrible accident. The man, on trying to hook up a heavy piece of meat above his head, slipped, and the sharp hook penetrated his arm, so that he himself was suspended.

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* Medical Notes and Reflections, chap. 5.

On being examined, he was pale, almost pulseless, and expressed himself as suffering acute agony. The arm could not be moved without causing excessive pain, and in cutting off the sleeve he frequently cried out, yet when the arm was exposed it was found to be quite uninjured, the hook having only traversed the sleeve of his coat. A clergyman told me, that some time ago suspicions were entertained in his parish of a woman, who was supposed to have poisoned her newly-born infant. The coffin was exhumed, and the procurator-fiscal who attended with the medical men to examine the body, declared that he already perceived the odour of decomposition, which made him feel faint, and in consequence he withdrew. But, on opening the coffin, it was found to be empty, and it was afterwards ascertained that no child had been born, and consequently no murder committed. Numerous instances might be given where at duels, or on other occasions, individuals have supposed themselves to be wounded, and fallen down as if dead, without having received the slightest injury.

Then, as regards irregular movements in connection with predominant ideas, the phenomena of hysteria and chorea will at once suggest themselves to you. In the latter disease, peculiar movements are always occasioned by the exercise of volition, or by certain impulses which cannot be controlled. In hydrophobia there is a remarkable susceptibility to the most minute circumstances, giving rise in any way to the idea of drink, which invariably excites the most fearful spasms. Numerous singular instances of occasional and partial perversion of the voluntary movements might be quoted, either arising spontaneously, acquired by habit, produced in animals by injuring certain parts of the nervous system, or by giving particular drugs; but I shall content myself with two, formerly under the care of Dr. Christison, which he was so good as to communicate to me. The first was that of a gentleman, who frequently could not carry out what he willed to perform. Often, on endeavouring to undress, he was two hours before he could get off his coat, all his other mental faculties being perfect. On one occasion, having ordered a glass of water, it was presented to him on a tray, but he could not take it, though anxious to do so, and he kept the servant standing before him for half an hour, when the obstruction was overcome. In the other case the peculiarity was limited. If, when walking in the street, he came to a gap in the line of houses, his will suddenly became inoperative, and he could not proceed. An unbuilt-on space in the street was sure to stop him. Crossing a street also was very difficult, and on going in or out of a door he was always arrested for some minutes. Both these gentlemen graphically described their feelings to be "as if another person had taken possession of their will." These and similar perversions of motion, whether of excess or diminution, however produced, cannot always be governed by predominant ideas, but that they frequently are so is proved by a multitude of facts. The old story of Boerhaave is as apposite as any other, who is said to have immediately cured several girls at school of chorea, by threatening, in a loud voice, that the next who was attacked should have the actual cautery applied.

The power of imitation, which must operate through the mind of the individual, is known by medical men to be very strong, however inexplicable. Immoderate laughter is very catching; few can resist even a well-imitated yawn, and on board ship nothing more certainly brings on sea-sickness than seeing others ill. Habits, modes of expression, dialect, carriage of the body, and peculiar movements, are also readily acquired from those around us. On visiting the Bosjesmen, who were exhibited here some years ago, the effect of their dance on the audience was striking. Beginning slow, to the rhythmical beatings of their clubs, the noise became gradually louder, more and more exciting, every step and gesture keeping exact time. I myself, and some friends with me, at length felt a peculiar jar all through our systems, our own feet involuntarily kept time with the dancers, and from the feelings then experienced, we could at all events comprehend the nature of those impulses, which have caused multitudes to join in the dance of St. Vitus or of Tarantism.

In all these, and various other cases which might be cited, it must be evident that the effect is produced by operating on the mind of the individual, and through that on his bodily powers. In short, predominant ideas, whether originating spontaneously or suggested by the words and actions of others, seem to be the exciting cause in individuals, affected with a peculiar condition of the cerebral functions. As regards the nature of this condition, it seems analogous to that of sleep or dreaming, in which certain faculties of the mind are active, and may be even stimulated into excessive action, whilst others are suspended. Hence it has been called Hypnotism by Mr. Braid.* All the phenomena produced, are strictly analogous to what medical men are acquainted with in various morbid states; and it must now be considered as well established, that in certain conditions of the nervous system they may be induced at will. This conclusion, however, is something new, for it has but recently been received in physiology or pathology, that a condition of the cerebral functions may be occasioned in apparently healthy persons in which suggestive ideas are capable of producing those phenomena we have described, and which render them, for the time, as irresponsible as monomaniacs. Yet such is really the fact, and once admitted into physiology, must have an important influence on the theory and practice of medicine. Such condition may probably be accounted for physiologically in the following manner:—

We have previously seen that the cerebral lobes contain white fibres, which run in three directions. 1st, Those which pass from below upwards, and connect the hemispherical ganglion with the spinal cord. 2d, Those which pass transversely, forming the commissures, and which unite the two hemispheres. And 3d, Those which run from before backwards, uniting the anterior with the posterior lobes on each side (p. 113). It has also been stated that these fibres are probably subservient to that combination of the mental faculties which characterises thought (p. 116). Now all metaphysicians and physiologists are agreed that the mind is composed of various faculties, and that different portions of the nervous mass are necessary for their manifestation. True, it is by no means determined what, or how many faculties mind should be divided into, still less is it known which parts of the brain are necessary for the manifestation of each. But let the first proposition be granted, then there is no difficulty in supposing that one or more of these may be paralysed or suspended, whilst others are entire, any more than there is in knowing that sensation may be lost whilst motion remains intact, although the nerve fibres of both run side by side. I presume, then, that certain mental faculties are, as the result of exhausted attention, temporarily paralysed or suspended, whilst others are rendered active in consequence of being stimulated by suggestive ideas; that the psychical stimuli of the former make no impressions on the cerebral conducting fibres, whilst those of the latter are increased in intensity; that the proper balance of the mind is thereby disturbed, and thus the individual for the time being acts and talks as if the predominant idea was a reality. The condition is analogous so far with ordinary somnambulism, certain forms of hypochondriasis and monomania, but admits of infinite changes according to the nature of the idea suggested.

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* Neurypnology, or the Rationale of Nervous Sleep. 1843.

According to this theory, therefore, we suppose that a psychical stimulus is generated, which, uncontrolled by the other mental operations acting under ordinary circumstances, induces impressions on the peripheral extremities of the cerebral fibres, the influence of which only is conveyed outwards to the muscles moved. In the same manner the remembrance of sensations can always be called up by the mind; but under ordinary circumstances we know they are *only* remembrances, from the exercise of judgment, comparison, and other mental faculties; but these being exhausted, in the condition under consideration, while the suggested idea is predominant, leave the individual a believer in its reality.

In this manner we attribute to the faculties of the mind a certain power of correcting the fallacies which each is liable to fall into, in the same way that the illusions of one sense are capable of being detected by the healthy use of the other senses. We further believe, that the apparatus necessary for the former operations consists of the nerve fibres which unite different parts of the hemispherical ganglion, whilst that necessary for the latter are the nerve fibres connecting together the organs of sense and the ganglia at the base of the encephalon. A healthy and sound mind is characterised by the proper balance of all the mental faculties, in the same manner that a healthy body is dependent on the proper action of all the nerves. There are mental illusions and sensorial illusions, one caused by predominant ideas, and corrected by proper reasoning; the other caused by perversion of one sense, and corrected by the right application of the others. Both these conditions are intimately united, and operate on each other, inasmuch as voluntary and emotional movements and sensation are mental operations.

This theory, if further elaborated, appears to me consistent with the facts described at the commencement of this lecture, and capable of explaining them on physiological principles.*

We may now ask ourselves, whether the facts which have been ascertained, and the generalisations which flow from them, are capable of being rendered useful in the practice of medicine? The beneficial influence of hope and confidence over disease is as well known to medical men as the injurious tendency of fear and despondency. This effect of mind on the body has from the earliest periods been seized upon by individuals as a ground for veneration or astonishment. In ancient times the heathen priests were the physicians, and the temples were converted into so many dispensaries, at which the sick applied for relief. In catholic countries, during the middle ages, the offices of priest and physician were frequently united in one person, so that the powerful effects of certain shrines, and the benefits of pilgrimages in cases not admitting of simple cure, met with every encouragement. From what has preceded, it must be allowed, that so far from its being improbable that real cures were so effected, all that we know of the effects of confident promises on the one hand, and belief on the other, render it very likely that many such occurred. The legends of the saints, the history of witchcraft, the journal of Mr. Wesley, the accounts of celebrated pilgrimages, the virtues of particular shrines, and the writings of religious enthusiasts generally, abound in wonderful cures. Charms, amulets, and relics are stated to have at once banished all kinds of agony, and removed numerous nervous diseases. Many of these are certainly incredible, whilst others are perfectly conceivable. The benefits of the royal touch are confirmed by the observations of Richard Wiseman, and the cures performed by Greatrakes are warranted by Robert Boyle. In all these cases, there can be little doubt that any benefit which did occur may be attributed to a strong belief, on the part of the patient, in the efficacy of the means employed.†

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* It has lately been proposed by Mr. Braid to call the condition of which we have been speaking, and which results from a dominant idea—*monoideism.* The term *monoideology* would indicate the doctrine of the influence of dominant ideas in controlling mental and physical action. To *monoideise* might express the act of performing processes for inducing *monoideism,* and *monoideiser* designate the person who *monoideises.* Then *monodeised* will indicate the condition of the person, and *monoideodynamics* the mental and physical changes which result from the process.

† The wonderful cures performed by Mesmer, and all those who have convinced themselves and others of the advantages of the ephemeral systems which are continually springing up around us, are much indebted to belief in their efficacy on the part of the patient. Dr. Haygarth, of Bath, performed all the cures of Mesmer and Perkins with

In recent times more systematic attempts have been made to relieve pain, control nervous excitement, lessen muscular debility, and stimulate certain secretions. If it be considered that the power of producing profound sleep, and acting on the nervous functions, may be manifested in so many individuals as one in twenty of the whole population, it must be evident that in a class of persons particularly predisposed, the number capable of being affected would be much greater. This subject, however, is yet in its infancy, and has to be separated from the charlatanism which has hitherto been mingled with it. The labours of Dr. Eisdale among the natives of India, and of Mr. Braid in Manchester, exhibit a worthy commencement to the rational treatment of disorders by the means now alluded to; and there can be little doubt that in no long time its influence, when further studied, will be acknowledged. But how far this influence is dependent on the confidence of the patient; on the belief in some mysterious circumstance, which is presumed to produce the effect, or on some law-regulating function through the mind, further observation alone can determine.

In the meantime, it seems to me that not only are we indebted to Mr. Braid for having first clearly demonstrated that the phenomena described are wholly occasioned by predominant ideas in the individual, but for the first contribution of any value to the mode of applying this theory to the cure of disease. By suggesting thoughts to the patients in various ways, sometimes by speaking so that they may hear what is said, at others by directing their thoughts to certain subjects, and occasionally rendering these more vivid by repetition or by definite physical impressions, we can fix certain ideas strongly in their minds. These ideas act as stimulants or sedatives according to their purport, and the current of thought directed to or withdrawn from particular organs or functions. Remarkable cases have been met with where a judicious application of this doctrine has removed insomnolence or various kinds of pain, spasms, and other evidences of excitement; where hysterical paralysis of the limbs or special organs of sense have been relieved or cured, and where the torpid functions of lactation, perspiration, defæcation, menstruation, etc., have been rendered more active.* That such results may be induced must be admitted

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two bits of wood made to resemble the metallic tractors of the latter,—that is, so long as he kept the secret,—for the moment he published his book, and the imposition was known, no more cures were accomplished. In the same manner, there is every reason to believe that the efficacy of many public nostrums resides in the reputation which surrounds them. Miss Harriet Martineau, in publishing her own case, naïvely remarks:—"If at any time during my illness I had been asked, with serious purpose, whether I believed there was no resource for me? I should have replied that Mesmerism might perhaps give me partial relief."—(*Letters on Mesmerism*, 1845, p. 4.) No wonder, therefore, that when at length it *was* tried, it produced the desired effect; and the medical attendant, seeing the delusion that existed, perhaps acted judiciously in bringing the lady *en rapport* with the first magnetiser he could procure.

* See Braid on Hypnotic Therapeutics—Monthly Journal of Medical Science, July 1853.

by all who reflect—1st, On the undoubted fact that certain persons are and can be made slaves of dominant ideas; and, 2d, On the equally undoubted fact that such mental ideas are known by universal experience to exercise a stimulating or depressing effect on all the bodily functions. Hence why many drugs and systems of treatment which are inert or uncertain in their action, are supposed to act through the blood or on the tissues directly, although in truth they only operate by exciting expectant ideas, and through them indirectly on the parts disordered.

On the other hand, the indiscriminate performance of experiments on nervous individuals may be injurious. During the session 1850-51, society in Edinburgh was greatly agitated by this subject. Fashionable parties were converted into scenes of experiments on the cerebral functions. Noblemen, members of the learned professions, and respectable citizens, amused themselves in private, whilst public discourses and exhibitions to an unusual extent were got up for the entertainment of the public. On one occasion the Royal Medical Society was operated on; and if a proof of the correctness of the facts described be required, it would be found in the circumstance, that the nervous aberrations noticed, were readily exhibited in some of its most sceptical members. The result of this excitement was an increased degree of nervousness in many individuals. In some educational establishments, girls and boys threw themselves into states of trance and ecstasy, or showed their fixed eyeballs and rigid limbs, for the amusement of their companions. Sensitive ladies did not object to indulge in the emotions so occasioned, and exhibited themselves in a like way for the entertainment of evening parties. Several instances were known to me where intelligent young men—students in this University—were, for a longer or shorter time, incapacitated from following their ordinary occupations, and obliged, from want of attention and mental power, to stay away from their classes. Some of these, from a feeling of the injury they have sustained, very properly refused to allow any experiments to be tried on them; and the parents of very sensitive young persons, from the obvious detriment their health has sustained, also forbade a repetition of these scenes. One young man of great promise, who was at that time frequently operated on, is at this moment in a lunatic asylum. I thought myself warranted in calling such a state of things "The Edinburgh Mesmeric Mania of 1851."

The disease cannot be considered as free from danger. The great object of all who seek proper self-education is to control the emotions and passions, and regulate the imagination by the severer faculties of judgment, comparison, and attention. Hitherto medical men, so far from exciting, have done all in their power to prevent such phenomena as have been described; but now that it has been clearly shown that they may be produced in numbers of people by the ignorant and mercenary, every effort should be made to discourage such experiments. It is well known that cases are on record of individuals who, commencing by the imitation of hysterical or epileptic convulsions, have at length found themselves really labouring under those diseases; nor is it unreasonable to suppose, that the mental faculties will be greatly injured in persons, who frequently surrender up their own wills, and act in accordance with the extravagant ideas suggested to them. After all, the pleasure of excitement principally consists in feeling that it can be regulated, and is under command. The moment it ceases to be so, a sense of the imperfection becomes most agonising to the mind, and gives rise to that despondency so common among the insane. Hence those only who have studied this subject, and are prepared as medical men to exercise judiciously the influence they may possess on the minds of their patients, ought to attempt the cure of nervous diseases in the manner now referred to.

If, then, it has been satisfactorily shown that in consequence of our advanced knowledge of diagnosis and pathology, an antiphlogistic practice is opposed to the cure of diseases of nutrition, whilst predominant mental ideas may be made to influence diseases of innervation, it follows that many of the principles which have hitherto guided us in their treatment must be considerably modified. That medical practice has undergone a great revolution during the last fifteen years, is a fact already so well established, that it can be no longer denied. Firmly believing that many of the changes which have been effected are permanent improvements in our art, and may be traced to the advance in the sciences on which that art is based, it will be our especial object in the succeeding pages to point out in what way more perfect principles have led to a better practice. Amid the multiplicity of conflicting statements, and the clashing of opposing systems, it will be our honest desire to separate what is known from what is unknown, and lay down such rules for treatment as both science and experience may alike confirm.

SECTION IV.

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DISEASES OF THE NERVOUS SYSTEM.

The diagnosis of nervous disorders is dependent on a kind of knowledge altogether different from that appertaining to the consideration of cutaneous, pulmonary, or cardiac affections. In these last, as we shall see, a direct appeal to the senses enables us to arrive at conclusions with tolerable accuracy. An arbitrary classification of skin diseases once established, with clear definitions, we have only to apply these to the appearances observed to ascertain the disorder. Once master the practical difficulty of distinguishing with exactitude moist from dry rales, whether a murmur replace the first or second sound of the heart, and what is its position, and we possess a key which, with the aid of percussion, will frequently enable us to arrive at the certain diagnosis of pulmonary and cardiac affections. But, with regard to nervous diseases, no such exactitude is attainable in the present state of the science or art of medicine. The encephalon is an aggregation of various parts, more or less connected together, the functions of which are by no means determined. In health these act in harmony, but in disease they are so irregularly disordered that, while the action of one is excited, that of another may be perverted or annihilated. Then nothing is more common than to observe some of the most fatal nervous diseases, such as hydrophobia, leaving after death no lesion detectable by the most careful histological examination, whilst on other occasions tumours and extensive destruction of the cerebral mass may exist, without producing any effects whatever. And yet, notwithstanding the obvious difficulties which oppose themselves to exactitude of diagnosis, careful observation, conjoined with a knowledge of physiology and pathology, will enable us to approximate closely towards, if not actually reach, a correct opinion in the great majority of cases.

The same circumstances render a pathological classification of nervous diseases impossible. Thus any one special lesion may produce the most remarkably different effects, according as it occurs rapidly or slowly; as it is single or multiple; as it is small or great in amount; as its nature is simple or compound; or as it affects different parts of the nervous mass. Thus the compound functional character of the brain alone, if disordered, may give rise to increase, perversion, or loss of three functions, viz., intelligence, sensation, and motion, each as different in their modes of manifestation and effects, as are the important functions of digestion, respiration, and secretion. Neither can we arrange nervous diseases well in accordance with the symptoms which may be present, as these are so various and so complicated in individual cases. This, however, is the method which has stamped its features on medical literature since the days of Hippocrates, and from which in consequence, without anything more certain to offer, it is in the present state of medical science impossible to escape. What we, however, strenuously contend for, is the inconsistency in our nomenclature of applying to morbid lesions, the same names as have long been recognised in a different sense, as indicating groups of symptoms. Apoplexy, for instance, is not necessarily hemorrhage into the brain, nor does every hemorrhage produce apoplexy. If, then, we use a mixed classification which seems to be the best now open to us, that is one partly anatomical, founded on altered structures, and partly physiological, founded on altered functions (that is, symptoms), let us define accurately in all instances, what we mean by the names employed. Thus we can use the terms congestion, softening, and suppuration of, or exudation, effusion, and hemorrhage into the brain and spinal cord, as we do when these lesions affect any other organs. But we should understand by *apoplexy*, loss of consciousness and voluntary motion, beginning at the brain; by *epilepsy*, paroxysmal loss of consciousness with convulsion; by *spasm*, tonic; by *convulsion*, clonic increased contractions of the muscles; and by *paralysis*, loss of motor, or sensitive power of a part, etc. If we employ morbid lesions to designate the disease, we regard groups of symptoms as their effects. But if we use groups of symptoms to denominate the disease, then, however well we may observe these, we are as often incapable of determining what are the structural changes on which they immediately depend.

The key to the diagnosis of nervous diseases will be found in the general sketch we have given of the function of innervation (p. 114), and especially in the pathological laws which regulate diseased action of the nervous system, to which we refer the reader (p. 120). The morbid anatomy of the nervous system will be found treated of in various parts of the work.* But there is one predominant lesion, which has lately had much light thrown upon it histologically, and which is so important in a diagnostic point of view, that we propose alluding to it, before entering on the consideration of individual nervous diseases.

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* Congestion of the cerebral vessels, pp. 120 to 123. Exudative softenings, pp. 136, 137. Albuminous degeneration, pp. 221-222. Pigmentary degeneration, pp. 236-238. Mineral degeneration, p. 245.

ON THE PATHOLOGY OF CEREBRAL AND SPINAL SOFTENINGS, AND ON THE NECESSITY OF EMPLOYING THE MICROSCOPE TO ASCERTAIN THEIR NATURE.

The nature of cerebral and spinal softenings has been much disputed. Some attribute them entirely to chronic or acute inflammation; others, while they acknowledge that some softenings are undoubtedly thus produced, are also of opinion, that they may occasionally depend upon other causes. Thus softening has been considered a lesion *sui generis*, similar to what occurs in ataxic fever (Recamier), to *gangrena senilis* (Rostan, Abercromby), to obliteration of the arteries (Bright, Carswell), or to a diminution of nutrition (Delaberge, Monneret). It has also been referred to post-mortem maceration (Carswell, Paterson of Leith), and is undoubtedly often produced by mechanical violence after death. The difficulty hitherto has been how to distinguish with precision one kind of softening from another.

From a careful analysis of numerous cases of cerebral softenings, I have arrived at the conclusion that they may originate in six ways. 1*st*, From exudation which is infiltrated among the elementary nervous structures; 2*d*, from a mechanical breaking-up of these structures by hemorrhagic extravasations, whether in mass or infiltrated in small isolated points; 3*d*, from fatty degeneration of the nerve cells, independent of exudation; 4*th*, from the mere imbibition of serum, which loosens the connection between the nerve-tubes and cells; 5*th*, from mechanical violence in exposing the nervous centres; and 6*th*, from putrefaction.

1*st*, *Exudative or inflammatory softening* always contains granules and granule cells, which are numerous according to the degree of softening. The granules are for the most part seen coating the vessels (Figs. 104, 293, and 294), and the cells also may occasionally be seen there in various stages of development (Fig. 106). In the demonstrations that are made under the microscope, they are frequently seen diffused among the tubes (Fig. 360), which according to the severity and extent of the lesion are easily separated from one another, or broken up in a variety of ways. When recent, the serum which

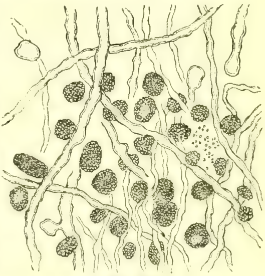

Fig. 360.

Fig. 360. Structure of inflammatory exudative softening of the lumbar portion of the spinal cord, showing granule cells infiltrated among the nerve-tubes in a paraplegic individual.—(*Wedl.*) 250 *diam.*

accompanies the exudation is infiltrated among the nervous substance, and may assist occasionally in producing softening, although for the most part it is rapidly absorbed. In chronic cases this form of softening may be regarded in one sense as a fatty degeneration, although, when speaking of this last lesion, I have stated my reasons for considering it as a transformation of the exudation and not of the nervous substance. (See p. 229.) Simple, tubercular, and cancerous exudations alike cause cerebral or spinal softenings, when the characters peculiar to each are present. Tubercular masses in the brain are generally surrounded by a layer of cerebral substance exhibiting all the characters of this form of softening. (Fig. 362). Cancerous exudation into the brain is very rare. (Fig. 260).

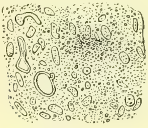
Fig. 361.

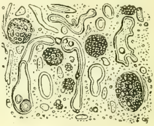
Fig. 362.

2*d*, *Hemorrhagic softening.*—When blood is extravasated with force into the cerebral structure, it breaks up the nerve tubes of the part and coagulates. The coagulum then forms a solid mass, whilst the serum, more or less tinged with colouring matter, is infiltrated to a greater or less distance and absorbed. Under such circumstances, the softened nervous tissue surrounding the clot presents fragments of the nerve-tubes alone, which under the microscope frequently exhibit a peculiar tendency to form circular, oval, or irregularly formed globules, with double outlines, as in Fig. 363. There are none of the granule cells so characteristic of an inflammatory softening, although they may appear later, as the result of exudation from the cerebral vessels surrounding the clot. In such cases the greatest variation in the appearance of the nerve-tubes is observable, from a

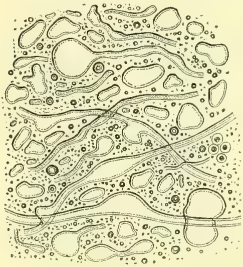
Fig. 363.

Fig. 361. Structure of a tubercular exudation in the cerebellum, composed of granules and tubercle corpuscles, with a few fragments of nerve-tubes.

Fig. 362. Structure of the softened cerebellum, immediately external to the same tubercular mass, containing a larger number of fragments of the nerve-tubes, with numerous granular corpuscles. 250 *diam.*

Fig. 363. Structure of the softened cerebral substance, surrounding a recent clot of blood, showing the appearance assumed by the nerve-tubes when broken up, and softened by imbibition with serum.—See Apoplexy, case of Pitbladdo. 250 *diam.*

slight diminution in their natural firmness and consistence, which renders them easily separable, or causes varicosities or swellings in them to be readily produced on pressure, up to a condition when they exhibit nothing but fragments and separate globules, as in Fig. 363.

The coloured cerebral softenings which are subsequently produced as a result of hemorrhage are owing to the transformations which go on in the coagulum itself. They assume a bright orange, brick red, yellow, fawn, or dirty brown colour, and under the microscope are found to consist of hematine in various forms and tints. Thus the whole may be granular, or mingled with crystals of hematoidine or melanine; and the granules, granular masses, and celloid degenerations, may present numerous shades of orange, red, brown, black, etc. etc. (See Pigmentary Degeneration, p. 235, *et seq.*)

3*d*. *True fatty softening.*—This lesion, that is, a primary fatty degeneration independent of exudation or hemorrhage, is one of the existence of which I was for a long time very doubtful. Careful investigation, however, has satisfied me, that it may occasionally, though rarely, present itself, apparently following obstruction of arteries. In this case the vessels are not coated necessarily with granular exudation, but the nerve-cells undergo the fatty degeneration primarily and are enlarged. The walls of many of them also are dissolved, leaving triangular or crescentic-shaped granular masses between the nerve-tubes. This alteration is accompanied with diminution of the cerebral density, and the nerve-tubes are also easily separated and broken up, though not so readily, as in the last form of softening noticed.

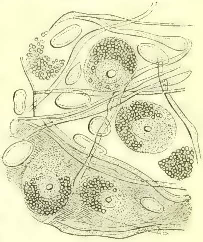

Fig. 364.

4*th*. *Serous or dropsical softening.*—This kind of softening is due to imbibition of the serum, which is effused into the ventricles in cases of hydrocephalus and other diseases. Hence it is only found in the neighbourhood of such effusions, and most commonly in the central portions of the brain, as the white matter of the septum lucidum, fornix, etc. It is the white softening of morbid anatomists, and consists structurally of nothing but the œdematous normal elements of the parts, without any of the changes peculiar to the exudative, hemorrhagic, or true fatty softenings. The observations of Dr. Robert Paterson of Leith, exhibited that the brain substance was very porous, and that if a slice of it was placed in water, it readily imbibed a considerable quantity, becoming at the same time more soft. Whether

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Fig. 364. Structure of the softened pons varolii, in a case where the basilar artery was obstructed, shewing true fatty degeneration of the nerve cells, among somewhat softened and broken up nerve-tubes.—See Cerebral Hemorrhage, case of Alexander Walker. 250 *diam.*

such softening ever occurs in the living body is very doubtful. It is most probably a post-mortem change. Sometimes serum is found to a considerable extent in the ventricles, without surrounding softening. The fluid apparently in such cases has not passed through the lining membrane of the ventricles. At other times this has occurred, and the softening so occasioned is found to be greatest near the central parts, and to diminish according to the distance from them. The causes sometimes producing and at others impeding the post-mortem imbibition are unknown.

5th. Mechanical softening.—I have frequently seen softenings occasioned in the brain, and more frequently still in the spinal cord, from crushing the nervous texture, after death in various ways. Thus the saw or chisel may occasion mechanical softenings in the superficial parts of the brain, when the calvarium is being removed by inexperienced or unskilful operators. In France, where the hammer is used for this purpose, it is a frequent cause of superficial softenings. The spinal cord is especially liable to be injured, by slipping of the chisel or lever used in elevating the posterior spinous processes of the vertebræ. Portions of soft nervous tissue, such as the corpus striatum, have frequently had their texture reduced to a pulpy consistence by mere handling, or by constant application of the finger simply to ascertain whether it be softened or no. I have seen softenings produced in all these ways, so exactly resembling such as may be occasioned by disease, as to give rise to the most erroneous opinions. They are only to be distinguished by a microscopical examination, and by a careful consideration of the symptoms during life, and the probable causes producing them after death.

6th. Putrefactive softening.—This may occur in warm weather, from the body having been examined long after death, or from accidental causes. Hence the necessity of always stating the number of hours after death that the examination is made. Such softenings are always diffused through considerable masses of cerebral texture, and may be recognised by this circumstance combined with an absence of all the signs which distinguish the other forms.

Of these six kinds of softening found in the body after death, only the first three occur in the living subject, and give rise to symptoms, and of these three, the pure fatty degeneration, though frequently associated with the others, has been so seldom noticed, that we are to a great extent unacquainted with its symptoms as a special lesion. As regards the last three which have been frequently confounded by morbid anatomists with the others, and all attributed to one cause, I think we can distinguish such as are the result of exudation from such as are not.

Further, from a careful analysis of 32 cases of softening of the nervous centres, which I published in 1842-3,* it was shown that different symptoms were connected with exudative or inflammatory, from those which occurred in non-inflammatory softening. In 24 of these cases in which cerebral softening was observed, granular corpuscles were present in 18, whilst in 6 no traces of these bodies could be found. On analysing the symptoms of the 24 cases, a marked difference was found between those resulting from one lesion or the other. Thus in the cases where *only* inflammatory softening was present, well-marked symptoms invariably existed, such as loss of consciousness, preceded or followed by dulness of intellect, contraction and rigidity of the extremities, or paralysis. On the other hand, in the 6 cases of non-inflammatory softening, there was no paralysis or contraction, and no dulness or disturbance of the intellect. Again, in the four cases where both lesions were present, symptoms could always be observed in the side opposite the inflammatory softening, while none existed opposite the non-inflammatory. An analysis of these 24 cases, therefore, leads to the conclusion, that the two kinds of softening we have endeavoured to establish are alike distinguishable, by their intimate structure, and by the symptoms accompanying them during life.

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* Edinburgh Medical and Surgical Journal, Nos. 153, 155, and 157.

Now all practical men agree in considering it a matter of extreme difficulty to reconcile, with any certainty, the morbid appearances found in the brain, with the symptoms previously observed. The future microscopic examination of the softening may serve to prevent much of the error that has hitherto been committed. For instance, softening of the fornix, septum lucidum, and central parts of the brain, may exist in two cases. To the naked eye they may be in every respect identical, and yet the microscope enables us to determine that the one contains granular corpuscles, whilst, in the other, not one of these bodies is to be found. It becomes evident, then, that previous to this distinction having been made, two different lesions were confounded together; and that a different train of symptoms should, under such circumstances, be occasioned, is only to be expected. Again it has frequently excited surprise, that, notwithstanding the existence of well-marked symptoms of softening, nothing was to be discovered after death. Now I have demonstrated in several instances that, although to the naked sight no morbid lesion was apparent, still portions of brain might contain the same granular corpuscles as are to be seen in more apparent lesions; and that by considering such parts diseased, all the symptoms might be explained according to the pathological laws I have previously referred to (p. 120, *et seq.*) By excluding these sources of error, therefore, and by being enabled at once to distinguish the lesion dependent on inflammation from others which simulate it, we shall be enabled to obtain more exact data for future investigations. From the observations recorded, however, the two following propositions may, I think, be established. 1*st*, That pathologists have hitherto confounded softening dependent on disease during life, with softening occasioned by post-mortem changes or mechanical violence. 2*d*, That notwithstanding the most anxious search, and the existence during life of the most decided symptoms of softening, the organic disease, though really present, has escaped observation.

PROPOSITION 1.—*That pathologists have hitherto confounded softening dependent on disease during life, with softening occasioned by post-mortem changes or mechanical violence.*

With respect to this proposition it may be observed, that in many cases where no symptoms were present during life, extensive softening of the brain has been found after death. This is a well-known fact, and is one which tends in no small degree to throw confusion on the pathology of nervous diseases. Thus, in one case of a series I published in 1843,* there was extensive softening of the central portion of the brain, corpora striata, and optic thalami, which, however, contained no granular corpuscles. The symptoms were sudden insensibility and convulsions, which evidently depended on a capillary apoplexy that was also present. No paralysis or contraction existed. Four other cases were recorded, with more or less softening of the brain, without head symptoms, and without granular corpuscles in the softened portions.

Now in all these five cases there was an extensive softening, the nature of which it was impossible for any one to distinguish positively, by unaided sight. In none of them did granular corpuscles exist, and in none did those symptoms occur which are peculiar to softenings produced during life.

In addition to these five cases there were four others, where, conjoined with an exudative softening producing particular symptoms, there was also a softening, occasioning no symptoms whatever, containing no granule cells. The circumstances attendant on these nine cases, therefore, must convince us that softenings produced mechanically, or by post-mortem changes, have frequently been mistaken for those occurring during life, and *must necessarily be so, so long as unaided sight is made the sole means of forming a judgment with respect to their nature.*

A perusal of these cases must satisfy any one that pathologists have hitherto been confounding two distinct lesions, viz., a softening dependent on vital changes, and a softening dependent on mechanical or other causes.

PROPOSITION 2.—*That notwithstanding the most anxious search, and the existence during life of the most decided symptoms of softening, the organic disease, though really present, has escaped observation.*

In the series of cases alluded to there are several which serve to establish this proposition, of which I may more especially refer to two.

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* Pathological and Histological Researches on Inflammation of the Nervous Centres. By the Author. Edinburgh, 1843.

Case 1, a man had paralysis, with complete resolution of the limbs on the right side, and intense rigidity of those on the left. Death occurred in six hours. On dissection, a large coagulum of blood was discovered in the left hemisphere, thus explaining the paralysis on the right side. In the right hemisphere an old apoplectic cyst was found, and a number of small cavities, described by Dr. Sims as chronic softening undergoing a cure. Here, then, there was nothing acute, nothing to explain the intense rigidity. A microscopic examination demonstrated that these cavities contained numerous granular corpuscles and granules, thus proving the existence of structural changes in the right lobe of the brain, and explaining the rigidity on the left side of the body.

Case 2 was that of a man who entered the Infirmary, under Dr. Paterson, in 1842. All the symptoms of acute softening were present; paralysis of the left side, including rigidity and contraction of the left arm, dulness of intellect, and tonic spasms of the muscles of the mouth and neck. The right side was also affected in a slighter degree. As the case excited considerable interest, great care was taken in examining the brain after death. When the lateral ventricles were opened, it became a question whether the right corpus striatum was softened. Several persons applied their fingers, and endeavoured to ascertain the point. As the manual examination proceeded, the normal consistence of the part diminished, until at length it presented all the appearance of pultaceous softening. In this state it was shewn to Dr. Paterson, who naturally enough considered it to be the result of disease. I differed from him in opinion, first, because I had carefully observed the gradual increase of the softening in the manner alluded to; and secondly, because disease of the corpus striatum, in one side of the brain, could not have explained the well-marked symptoms which existed on both sides of the body. When the pons varolii was bisected, Dr. Peacock, who conducted the examination, conceived it to be softened; others who examined it could perceive no difference in the texture; its colour and consistence were unchanged. Reasoning from the symptoms, the lesion was very likely to exist. But how, it was argued, could a judgment be formed; we ought to reason from facts, not theories? Here, then, was an evident lesion of the corpus striatum, which explained nothing, and a problematical lesion of the pons varolii, which, however, did it exist, would satisfactorily account for the symptoms. In this state of uncertainty the microscope was sent for, and I demonstrated, and made evident to Drs. Paterson, Peacock, and all the students present, that the corpus striatum contained no granular corpuscles, whilst in the pons varolii they were very abundant. I have endeavoured to describe what took place on this occasion, from which it must be evident that had not the microscope been appealed to, the right corpus striatum would have been pronounced softened, whilst the real lesion in the pons varolii might have escaped observation. Under such circumstances this case would have added another to the inexplicable observations with which the records of nervous diseases abound.

What renders these cases, and several others I could relate, so remarkable and satisfactory is, that they are not instances where the dissection was performed in a hurried manner, and by incompetent persons. On the contrary, from the particular symptoms connected with them during life, the post-mortem examination was in all conducted with extreme care. The physician who had charge of the case was present. The examinations were witnessed or conducted by myself, in the presence of clerks and numerous students, and I may say that we were all in doubt until the microscope cleared up the difficulty. *These cases, therefore, sufficiently demonstrate that the naked sight is positively unable to detect lesions, even although they are directly indicated by the symptoms, and carefully looked for by experienced morbid anatomists.*

If, then, the two propositions formerly stated have been satisfactorily proved, and it is agreed that pathologists have been confounding vital with post-mortem softening, and overlooking the former, although undoubtedly present, it must be evident that many of the contradictions which have existed in connection with the pathology of nervous diseases may be accounted for. It must also be clear that no confidence can be placed in the analysis of cases, however numerous, when the sources of error now indicated have not been carefully excluded.

ACUTE HYDROCEPHALUS.

Case I.*—*Acute Hydrocephalus—Recovery.*

History.—Janet Reid, æt. 12—admitted June 12th, 1850. About three weeks ago she fell down and struck the back of her head violently, but soon recovered, and remained well until two days ago, when febrile symptoms, with headache, occurred. The following morning these continued, and vomiting came on, with great restlessness, and crying at night.

Symptoms on Admission.—On admission, she is very drowsy, and starts occasionally in her sleep. When roused she is fretful and irritable, and complains of headache. The pupils are dilated, but contractile on exposure to a strong light; pulse 104, of good strength; skin hot; tongue covered with a white fur, and dry; no appetite; great thirst; bowels not open for two days. Urine, sp. gr. 10.30, with phosphatic deposits. ℞. *Calomel, gr.* iij; *Pulv. Scammon, gr.* v., *P. pulvis.—Tales* ij., *Sumat* 1 *statim, alter post horâ tres.—Applicent. Hirudines* iv. *capiti.*

Progress of the Case.—*June 13th.*—Leeches bled well. Took both powders, and had an injection, which brought away one stool of a dark greenish colour.

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* Reported by Mr. E. S. Wason, Clinical Clerk.

Still complains of pain in the head, and general uneasiness when moved. But there has been no more vomiting, and there is no intolerance of light. Pupils natural; pulse 120, rather sharp; skin still hot and dry; continues drowsy, and fretful when moved; tongue white and moist.—*Sumat Ext. Sennæ*, ʒij, *ex aquâ, et repetatur, post horas quatuor si opus sit. June 15th.*—No headache, and not so drowsy. *June 22d.*—Since last report has been gradually improving; the febrile symptoms have ceased, and she was dismissed quite well.

CASE II.*—*Acute Hydrocephalus in a Scrofulous Child—Recovery.*

HISTORY.—John M'Aulay, æt. 9, son of a servant—admitted July 5, 1855. This boy is of a scrofulous constitution, and was admitted into the Surgical Hospital, June 22d, for a scrofulous sore on the left ankle. Three days afterwards he was attacked with scarlatina, which ran a mild course, and from which he was convalescent on the 29th. *June 30th*, however, he complained of not having slept, vomited several times, and was very restless. *July 1st*, he refused to eat anything, and in the course of the day screamed violently several times. There was also cephalalgia, drowsiness, photophobia, and great irritation when roused. In this condition he has remained until admitted into the Medical Clinical ward, the tendency to constipation having been counteracted by the administration of purgatives twice.

SYMPTOMS ON ADMISSION.—On admission, the face is pinched, and expressive of great irritability. He cries fretfully when touched or disturbed. The eyes are spasmodically closed, and he resists all attempts to open them; but when this is done, both pupils are seen to be dilated, and not movable on exposure to the light. On being left quiet, he turns away from the light, and relapses into a dose, interrupted by occasional moanings. Pulse slow and feeble, difficult to count from resistance of the child; skin and head of natural temperature. There is still a scrofulous ulcer on the left ankle, discharging pus of an offensive odour. Tongue furred; refuses food; bowels constipated; has no cough or pulmonary symptoms, and has never had strabismus, grinding of teeth, convulsion, or paralysis.—*To have beef tea, milk, and nutrients, with* ʒiij. *of sherry wine daily.* ℞. *Pulv. Jalap, gr.* v.; *Hyd. Chlorid, gr.* ij.; *ft. Pulv. hora somni sumendus.*

PROGRESS OF THE CASE.—*July 6th.*—At seven A.M. passed a copious, dark, offensive stool. Has been persuaded to take a little milk, but refuses nourishment. Still fretful and irritable, but the nurse says he did not scream or toss about so much during the night. Pulse 64, weak. Otherwise the same. *July 11th.*—Since last report the general irritability has somewhat diminished, and last night slept well. Has gradually been induced to take more nourishment. Does not scream now, but moans occasionally, and tosses about until exhaustion produces sleep. Now and then he puts his hand to the forehead, and says he feels pain there. His sight is occasionally dim, but at others he sees well. Cannot sustain any train of thought or conversation long. Still constipation, which is relieved every third day with the powder of calomel and jalap. *July 20th.*—There has been gradual improvement on the whole, although much variation from day to day. Some nights are more restless than others, with occasional screaming. He still puts his hand to the head, which is sometimes, he says, "sore." The pulse has varied from 60 to 80. The appetite has improved, and he takes more nourishment. Sight and memory more perfect. *August 3d.*—Has been occasionally screaming a good deal at night, but is now much better, and walks about on crutches, the scrofulous sore on the ankle being no better. *August 8th.*—It having been stated that he was affected with worms, he has taken some doses of the etherial extract of the Male Shield Fern, followed by purgatives. These have produced several stools, but no worms. His appetite and general health have now been greatly restored. There is no pain in the head, or restlessness at night, and he was sent back to the surgical wards to have his ulcer treated.

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* Reported by Mr. Robert Byers, Clinical Clerk.

Commentary.—In the two preceding cases we have good examples of that congestive and irritative state of the brain, which occurring in children has been regarded as indicative of acute hydrocephalus. Whether in either of them the disease had proceeded to actual effusion it is of course difficult to determine, although the pain in the head and restlessness passing into somnolence render this probable. In the first case, where the child was tolerably healthy, febrile phenomena with excitement were more pronounced than in the second scrofulous case, in which exhaustion was from the first more evident. Hence why a few leeches and laxatives constituted the treatment in the girl Reid, although, it will be observed, that their employment produced no marked improvement in the symptoms, the pulse on the following day being 120, sharp, the skin hot and dry, with a continuance of the drowsiness. Notwithstanding, no further antiphlogistic remedies were persisted in, and two days subsequently the patient became convalescent. In the second case an opposite plan of treatment was practised from the first. Here the pulse was slow and feeble, the symptoms were indicative of exhaustion, and this child not only had a scrofulous sore, but had recently recovered from an attack of scarlatina. Nutrients with wine, therefore, were perseveringly pressed upon the patient, notwithstanding the deficient appetite and nausea, with the effect of ultimately establishing a recovery.

CASE III.*—*Acute Hydrocephalus—Phthisis Pulmonalis—Death—Effusion into the Lateral Ventricles—Non-inflammatory softening of the central parts of the Brain—Meningitis at the base of Cranium—General Tuberculosis.*

HISTORY.—Mary Ann Flynn, æt. 6—admitted June 26, 1845. She is an intelligent child, of scrofulous and cachectic appearance, and greatly emaciated. From her own statement, she had influenza a year ago, and has had a cough ever since. Her diet has always been very poor, chiefly consisting of potatoes without any milk or animal food. Latterly she has experienced pain in the head, feverishness and restlessness at night, and yesterday she vomited several times.

SYMPTOMS ON ADMISSION.—On admission she complains of headache, pain in the back, great thirst, nausea, and cough. The pain in the head is felt over the forehead, sometimes extending to the entire head; is constant, but not severe at present. She has also slight pains in the back, not increased on pressure. Her intellectual powers are for her age unusually good; pupils and eyeballs natural; never had fits or other derangement of the nervous system. She has no appetite, refuses all food, but constantly desires drink; tongue covered with a whitish fur; mouth dry. She has not vomited since admission, but complains of distressing nausea; abdomen feels natural; had diarrhœa of light yellow fluid stools two days ago, which has now ceased; has frequent prolonged cough, not accompanied by much expectoration. On percussing the chest, there is comparative dulness under the right clavicle, and on auscultation over this part, a loud moist rattle accompanies the inspiration, extending down to the third rib. Here also there is bronchophony. Similar signs exist on the right side posteriorly, at the apex of lung, and over the rest of the chest there is great harshness with inspiration, and prolonged expiration with occasional sibilation. Respirations are 26 in the minute; pulse 150, small and somewhat hard; heart sounds rapid, but normal in character; skin hot, covered with perspiration; head unusually warm.—*Applicent. Hirudenes* iv. *temporibus—Habeat Vini Ipecac.* ℥ss.

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* Reported by Mr. D. P. Morris, Clinical Clerk.

Progress of the Case.—*June 27th.*—The emetic operated powerfully; nausea removed; headache relieved by the leeches, otherwise the same. *July 2d.*—Since the 28th there has been frequent vomiting, for which naphtha, hydrocyanic acid, and other remedies have been given without benefit. Little food has been taken. Loud gurgling audible under right clavicle; constant cough, with purulent expectoration. The surface is pale, and she cannot be spoken to or touched without causing cries and moaning. Bowels open; stools natural. There has been occasional diarrhœa, which has been checked by chalk mixture. Constant pains in the head, with great restlessness at night. Pupils slightly dilated; pulse 100, of good strength. *Abradatur Capillitium et Applicet. Emp. Lyttæ. Milk diet, with beef tea in small quantities. July 7th.*—Has continued much the same since last report, the vomiting being considerably less frequent however. Last night it is reported she was comatose, and could not be roused, and that convergent strabismus of the left eye was undoubtedly present. To-day she is lying on the right side, the knees drawn up to the abdomen; the face pale; surface cool; respiration easy. She does not answer questions, or protrude her tongue when desired, although her eyes and look are intelligent. No paralysis. Metallic resonance when she speaks or cries, under right clavicle. Pulse 104, of good strength. *Habeat Calomel, gr.* ij, *quaque tertia hora. July 12th.*—There has been alternate looseness and constipation of the bowels, the stools being of a spinach colour. Sometimes better, at others complaining of great pain in the head. The expression of countenance is now worn and haggard, with evident anxiety; eye and mind still peculiarly, and even painfully intelligent. No convulsion or paralysis, but great restlessness occasionally at night. At other times she sleeps well. Pulse is more frequent and weak, generally about 150 a minute. *Omit. Pulv. Calomel. Habeat Vini,* ʒij., *quaque secunda hora. July 13th.*—Has been gradually sinking since last report. To-day at the visit, pulse 180, feeble. Still intelligent, and answers questions. Tongue of unchanging colour. Died at five P.M., apparently from exhaustion, without previous coma, strabismus, convulsions, rigidity, or paralysis.

Sectio Cadaveris.—Forty-three hours after death.

Body greatly emaciated.

Head.—On removing the dura mater from the superior surface of the hemispheres, the arachnoid covering them was found unusually dry, and the pia mater somewhat pale. On stripping the membranes from the convolutions, and holding them up before the light, they could be seen to be sprinkled at irregular distances with minute white hard points, having the appearance of tubercle, deposited in the sub-arachnoid tissue. The glandulæ Pacchioni could easily be distinguished from them by their situation, softer consistence, and larger size. On removing slices from the hemispheres, fluctuation of fluid in the ventricles could readily be felt below. A puncture was cautiously made in the roof of the left lateral ventricle, and ℥iiiss of colourless serum were removed with a pipette. On declining the head towards the left side, ℥j more fluid was removed, which had evidently passed from the right ventricle into the left through the foramen of Monro. This last portion was turbid, and contained small floating fragments of lymph. On opening the right ventricle it was collapsed. The foramen of Monro was the size of a large pea. The fornix, internal walls of the ventricle and cerebral portions in the neighbourhood of the ventricles, were of pulpy consistence, but of their normal colour. On removing the brain from the cranium, the pons varolii, medulla oblongata, and corpora albicantia, were seen to be covered with a layer of pale gelatinous lymph, one-eighth of an inch in thickness. This layer only extended to the medulla oblongata inferiorly, where it passed through the foramen magnum, as was proved by careful examination of the spinal cord, which was healthy throughout. The third and fourth ventricles of the brain were enlarged, and distended with serum. The left lateral ventricle was also enlarged, especially its posterior and inferior cornua. The enlargement of the right lateral ventricle was confined principally to the anterior cornu.

Chest.—Pleuræ on right side sprinkled with miliary tubercle, situated below the serous surface. Both lungs studded throughout with hard miliary tubercle, of a grey colour; in some places however it was yellow and soft. The intervening pulmonary tissue was of a bright red colour, engorged, but pervious to air. In the superior lobe of right lung the tubercles were closely aggregated together, and contained numerous anfractuous cavities varying in size. Some were lined by a distinct membrane, and all were filled with scrofulous pus. Heart and vessels healthy. The bronchial glands enlarged from infiltration of yellow cheesy tubercle, mixed with pigmentary deposit.

Abdomen.—Liver of natural size. Gall ducts and gall bladder distended with fluid green bile. Kidneys healthy in size and general structure, but the vertical substance sprinkled over with minute grains of tubercle. Stomach healthy. The ilium, the seat of tubercular ulceration, throughout, situated principally in the aggregate glands. Large intestines healthy. Mesenteric and lumbar glands for the most part enlarged in consequence of tubercular infiltration. Spleen throughout studded with yellow cheesy tubercle, in granules varying in size from a pin's head to that of a pea. Peritoneum, here and there scattered over with hard miliary tubercle, deposited however below the serous membrane.

Microscopic Examination.—The pale gelatinous lymph at the base of the brain was principally composed of molecular matter, in which a few granular cells might here and there be detected. The turbid fluid at the floor of ventricles contained epithelium cells, some of which were undergoing the fatty degeneration. The white cerebral softening contained no granules or granule cells. The hard grey and soft yellow tubercles in various parts of the body were carefully examined, and presented their usual characters. (Figs. 126, 128.)

Commentary.—This is a well characterised case of acute hydrocephalus in a child also affected with general tuberculosis. From the first it was certain that it would be fatal, for in addition to the cerebral lesion we had to do with an advanced phthisical condition. With the exception of a few leeches applied immediately on admission, the treatment generally was nutrient, and wine was liberally administered. The appearances after death are strictly in accordance with all the symptoms which were carefully observed during life. Her mind throughout was unaffected, except when occasional drowsiness or coma prevailed, and the circumference of the hemisphere was normal, while the lesions observed were confined to the ventricles and base of the cerebrum. Then there was no paralysis or convulsion, and the softening of the central parts was proved to be serous. The pain, irritation, stupor, and other symptoms, are readily explicable by the tubercular meningitis and gradual distension of the ventricles with fluid.

The nature of acute hydrocephalus has been keenly disputed, and, whether it be inflammatory or non-inflammatory, and should be treated with antiphlogistics or nutrients, will be found to be discussed at great length in systematic works and numerous monographs.* The fact is, the group of symptoms indicating the occurrence of water in the brain are altogether insufficient to prove the existence of this morbid product in acute cases. What we observe are first symptoms of excitement, gradually passing into those of depression, occasionally accompanied by paroxysms of pain, restlessness, and screaming, alternating with drowsiness, exhaustion, and coma. These symptoms are common to various lesions of the brain, and may be the result of mere congestion, or of this state terminating in effusion and frequently in exudation. Hence why occasionally after death we find no lesion whatever; at others more or less distension of the ventricles with serum, and very commonly in addition exudation at the base of the cranium. In every case the symptoms are referable not so much to one or the other of these lesions, as to something which they all have in common, and this undoubtedly is more or less pressure on various portions of the brain, causing first irritation and then perversion of function, or so operating as to excite some parts and to depress others. In the great majority of cases the fluid distending the ventricles is more allied to the dropsies than to the exudations. Nay, even when lymph is thrown out at the base of the brain, the amount of serum in the ventricles is altogether disproportioned to the quantity of coagulated fibrin deposited. Hence I am disposed to think that, even when evidence of so-called inflammation does exist, as in Case III., still the fluid which distends the ventricles is owing to a mechanical obstruction of the vessels, causing dropsical effusion. As to the central white softening so commonly found in hydrocephalic cases, it is, in the vast majority of instances, a post-mortem appearance, caused by mechanical imbibition of the serum into the porous substance of the white tubular structure of the brain. I have seen this softening most extensive in cases where, immediately before death, the transmitting functions of the white central parts was perfect, and that no relation exists between the symptoms during life and such softening after death has been noticed by numerous observers.

In a special work on this subject (London: 1843), Dr. Risdon Bennett, looking to the scrofulous character of the children usually affected with this disease, refers its nature to "vital changes in the brain, chiefly in the central white parts, of the character probably of tubercular degeneration,—and that softening, effusion into the ventricles and meningitis, are all consequences of antecedent alterations of nutrition."—(Pp. 148-9.) This view, which contains the general truth, may, I think, now be more specifically stated as follows :—All circumstances, including scrofula, which weaken the general nutrition of the economy, tend to occasion languor and obstruction of the cerebral circulation. This, in young children, is especially liable to occasion congestions within the cranium, causing effusions and exudations, either simple or tubercular, and as a mechanical result of such effusion, those softenings so frequently found after death. Such appears to me the true pathology of acute hydrocephalus, including the "hydrocephaloid disease" of Dr. Marshall Hall.

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* See the author's article on Hydrocephalus, in the Library of Medicine. Vol. ii. London, 1840.

In the treatment of this disease much stress has been laid by practitioners on the question, as to whether in any given case the symptoms are or are not dependent on inflammation, and if so, what may be the character, seat, and stage of the inflammation. If the disease be inflammatory, blood-letting, with antiphlogistics and calomel, have been enjoined. When, on the other hand, it arises from diarrhœa, or after exhaustive diseases an opposite line of treatment has been the rule. The profession cannot be too grateful to Dr. Marshall Hall for clearly pointing out how all the symptoms of hydrocephalus frequently arise in children after long continued diarrhœa, febrile eruptions, or other exhaustive causes, and how they may frequently be restored under such circumstances by nutrients and stimulants. But it may now be asked whether, in fact, we possess the means of clearly distinguishing the inflammatory from the non-inflammatory forms, and whether, if we did, we are justified in treating the former by antiphlogistic remedies.

In reply to these questions, I would observe in the first place that all authors are agreed as to the difficulty of separating acute hydrocephalus from remittent fever, and no one, so far as I am aware, has ever pretended that they could point out with exactitude the symptoms which distinguish cases in which there are, and those in which there are not, exudations of lymph within the cranium. After the most careful examination of many cases, both during life and after death, I feel satisfied that conjoined with exactly the same train of symptoms, we may sometimes find only effusion of serum in the ventricles, with white softening, and at others more or less meningitis of the base. Again, I also feel satisfied that this meningitis, as proved after death by the existence of layers of lymph, so far from indicating a so-called sthenic constitution in children, much more frequently occurs in scrofulous and weak children. Of this, Case III. is an example, where with phthisis and general tuberculosis, there was found conjoined with effusion into the ventricles, inflammatory exudation at the base of the cranium. The distinctions, therefore, hitherto so much dwelt upon, of two distinct forms—an inflammatory and a non-inflammatory as guides to treatment—have no real existence, and are opposed to all positive research, as well as to a large experience in the observation and treatment of individual cases. When in addition it is considered that all the symptoms of acute hydrocephalus are referable to more or less pressure on different parts of the brain; that this pressure may be occasioned by congestion, effusion, or exudation; and that we have no means of determining which or how much of each is present in any individual case, it must, I think, be certain that it is impossible, in the vast majority of cases, and highly doubtful in all, to determine the existence of meningitis or cerebritis as a concomitant of acute hydrocephalus. Lastly, the symptoms of the "hydrocephaloid disease," so well described by Dr. Marshall Hall, in which all the phenomena of hydrocephalus occur, and are only distinguishable by the circumstance that they originate from exhaustive causes, should alone make us pause before we have recourse to a lowering system of practice.

But supposing we had the power to detect in any given case the occurrence of active exudation going on within the cranium, should we even then be justified in having recourse to blood-letting, general or local? The considerations we have previously entered into (p. 260, *et seq.*), first, as to the incompetency of this remedy and of antiphlogistics generally of meeting the end in view, and secondly, the fact that we can only reach the circulation within the cranium, by influencing the force of the heart, (p. 120, *et seq.*), are sufficient answers to this question. It follows, then, that the uncertainty of diagnosis, as well as the evil effects likely to result from the practice in these cases which almost always occur in weak children, are not only opposed to it, but perhaps sufficiently explain the acknowledged great mortality of the disease. For the like reasons the use of calomel to cause absorption of matters we have no means of detecting, appears equally unreasonable, even supposing it had been proved to possess that power, which it certainly has not.

On the other hand, the two first cases we have recorded are examples of what may be done by an opposite plan of treatment in acute hydrocephalus, and in the third case, we believe the practice followed to have been the only warrantable one which the desperate and necessarily fatal circumstances required. It bore reference to improving the general constitution and nutritive powers of the patient, which in all cases connected with a scrofulous habit are the indications to be more or less energetically followed according to the severity and duration of the disease.

CEREBRAL MENINGITIS.

CASE IV.*—*General Acute Meningitis supervening on Pleuro-Pneumonia.*

HISTORY.—David Murray, æt. 43, a coal heaver—admitted January 18, 1854. He has been an intemperate man, and a week previous to admission was seen by one of the pupils to be affected by delirium tremens. He now says, that on the 13th (which was the first day of thaw after frost and snow) he was much exposed to the weather while at work, but felt no ill effects until the morning of the 15th at four o'clock, when he awoke very sick, and vomited several times. He kept his bed, feeling feverish, and in the afternoon began to cough. On the morning of the 16th he experienced a sharp pain in the right chest, about three inches below the nipple, which was increased by coughing, and inspiring deeply, and prevented his lying on that side. Has had no rigor nor headache.

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* Reported by Mr. Robert Bird, Clinical Clerk.

Symptoms on Admission.—On admission, respiration is impeded by interrupted inspirations, which give pain. Over the lower half of the right lung posteriorly, there is marked dulness on percussion, loud crepitation on inspiration, and bronchophony. The sputa are scanty, consisting of gelatinous matter, with rusty brown patches. No dyspnœa. Pulse 120, strong and full; skin hot and dry; tongue dry, furred, and fissured; great thirst; no appetite; bowels open. Has no headache at present, but says he is restless at night, and sleeps badly. Other functions normal. *To have one-third of a grain of tartrate of antimony in solution every two hours.*

Progress of the Case.—*January 22d.*—Since last report the pneumonia has followed its usual course.—(See Pneumonia). On the 20th crepitation had disappeared, but has returned to-day. Yesterday evening was ordered a diuretic draught, containing *Sp. Æther. Nit.* ʒj. The pulse 130, weak, and at the visit his replies to questions were a little confused. *January 23d.*—Yesterday afternoon he was observed to mutter incoherently, but remained quiet until eight p.m., when he became violently delirious. He had a very wild and fierce expression of eye and countenance, insisted on getting up, would not be controlled, and struggled violently with those who endeavoured to restrain him. He spoke little, but made incoherent noises. The pupils were much dilated; the pulse very rapid and weak. *The head was shaved, and constant cold applied.* Prostration, however, coming on, *wine and stimulants were given freely.* He continued now and then to struggle violently; strabismus was apparent latterly. Died exhausted at five a.m. this morning.

Sectio Cadaveris.—Thirty-one hours after death.

Body greatly emaciated.

Head.—On removing the skull cap, the dura mater presented a uniform yellowish tint, dependent on a recent exudation below it. On removal, the sub-arachnoid tissue was infiltrated with a soft exudation, which covered the entire surface of both hemispheres, and of the cerebellum. It was as abundant at the base as on the superior surface of the brain. On cutting into the cerebral substance, it was observed that the yellow exudation accompanied the inflexions of the pia mater between the convolutions. The lateral ventricles contained ℥iss of turbid serum. The lining walls of the ventricles were a little congested; the choroid plexuses healthy. The septum lucidem rather soft, but the other portions of the brain normal.

Thorax.—Three lower fourths of the right lung presented the characters of grey hepatization posteriorly. The anterior surfaces were healthy. The pleuræ covering this lung were partially adherent, with some shreds of recent lymph. Other thoracic organs healthy.

Abdomen.—The liver enlarged, weighing 6 lbs. 4 oz., of pale colour, and soft. The spleen also soft and pulpy. Other abdominal organs healthy.

Microscopic Examination.—The exudation poured out in the sub-arachnoid cavity had everywhere undergone the transformation into pus. The turbid fluid in the lateral ventricles also contained some pus, with a few epithelial cells. The cerebral tissue was healthy. The liver cells contained an unusual amount of fatty granules. The pneumonic portion of the right lung was infiltrated with fluid molecular matter and pus corpuscles, most of which were more or less collapsed, and all of them very granular. The whole evidently in a state of disintegration.

Commentary.—In this man, who was intemperate, and labouring under pneumonia which was progressing favourably, there supervened at noon on the seventh day of the disease a little confusion in his ideas. This in the course of the afternoon passed into violent delirium, causing strabismus and dilated pupils. At night he became comatose, and died at five o'clock next morning. At the commencement of the pneumonia he had vomited, a symptom perhaps referable in him to cerebral irritation, a condition which the febrile state he was subsequently thrown into, however, did not appear to augment in any unusual degree. On examining the head after death, the subarachnoid cavity and involutions of the pia mater over the whole surface of the brain were loaded with purulent matter, and ℥iss of turbid serum was effused into the lateral ventricles. This, therefore, was an instance of very rapid death from meningitis, a result partly attributable to his previous intemperate habits, and partly to the circumstance that the disease appeared at a time when he was already much exhausted by the pneumonic attack. In this, as in Case III., it is observable that the occurrence of extensive exudation is in no way incompatible with depression of the bodily powers, a fact altogether opposed to the supposed connection between inflammation and a sthenic state of the constitution. In fact, the extent as well as the fatality of the head disease is probably to be attributed to the exhaustion of the vital powers at the time of its occurrence.

The pneumonia went through its usual progress, and on the day when the meningitis commenced, the returning crepitation was audible. On examination after death, the whole pulmonary exudation was found softened and converted into pus, which was already undergoing rapid disintegration. To this part of the case we shall again allude under the head of pneumonia.

CASE V.*—*Acute Meningitis at the Base of Brain—Serous Effusion into the Ventricles, with white softening of cerebral substance—Phthisis.*

HISTORY.—Helen Walker, æt. 21, a servant—admitted July 4, 1853. She has for some years been subject to cough and dyspnœa, but says she never had any serious illness until eleven days ago. She then experienced rigor, pain in the head, thirst, and other febrile symptoms. The headache has been variable in intensity, being sometimes slight, at others very severe.

SYMPTOMS ON ADMISSION.—On admission, she appears to be very weak and languid. Complains of severe frontal headache, which is increased towards night. The eyes are dull and heavy; pupils unaffected. No muscæ volitantes, tinnitus aurium, or vertigo. Is quite conscious, but has a tendency to stupor. The febrile symptoms have now for the most part disappeared. No thirst; appetite impaired;

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* Reported by Mr. G. C. Pirrie, Clinical Clerk.

tongue furred; pulse 84, soft. On examination of the chest, all the signs of phthisis, with cavities in both lungs, were detected. The other functions are normal. She requested to have an emetic which had previously relieved her, and one of ipecacuanha and sulphate of zinc was given.

Progress of the Case.—*July 5th.*—The emetic has not produced the same relief as formerly. Headache continues. In other respects the same. *Six leeches to be applied to the temples. July 6th.*—Last night, wandering of the mind, with slight delirium. To-day, great depression, and stupor. As the bowels have not been relieved, to have a drop of croton oil, on sugar, to be followed by an enema, if necessary. *Head to be shaved, and cold applied. Beef tea and nutrients. July 7th.*—Last night great incoherence of the mind, with raving. To-day at visit, still muttering. Eyes are heavy; pupils contracted; tongue moist and white. Takes no nourishment; bowels open; pulse 120, regular, but weak. *July 8th.*—No change. Coma coming on. *A blister to be applied to the occiput. July 9th.*—Coma, with occasional low muttering delirium; picking at the bed clothes; pulse almost imperceptible. Died on the morning of the 10th.

Sectio Cadaveris.—Thirty-six hours after death.

Body thin, but not much emaciated.

Head.—The arachnoid surfaces were very dry. The lateral ventricles contained about ℥1¼ of slightly turbid serum. The walls of the ventricles and central white portions of the brain in their neighbourhood were pultaceous, and easily broke down under a stream of water, presenting a rough surface, and on section a ragged edge, but retaining their natural colour. At the base of the brain, the crura cerebri are surrounded with soft yellow exudation, which is situated in the sub-arachnoid cavity, and extends to the thalami optici, and slightly into the locus perforatus posticus. No tubercle can be seen in the meninges, and about ʒij of serum were collected in the occipital depressions after removal of the brain.

Chest.—Both lungs were infiltrated with tubercle, especially the upper lobes. A cavity the size of a hazel-nut at the summit of left lung, and there were several in the upper lobe of right lung, communicating with one another.

Abdomen.—Abdominal organs healthy.

Microscopic Examination.—In the slightly turbid fluid of the ventricles, were several epithelial cells from the choroid plexuses, undergoing the fatty degeneration. The pultaceous white softening surrounding the ventricles, contained no granule cells or masses, and consisted of the tubes, easily broken down between glasses, presenting numerous large varicosities, circles with double lines, etc. (Fig. 363). The exudation at the base was chiefly molecular, with here and there traces of pus.

Commentary.—This case is in many respects like those formerly given under the head of acute hydrocephalus, and serves to illustrate the occurrence of acute meningitis with serous effusion, in a phthisical and exhausted subject. In this, as in the instances referred to, the leeches applied to the temples, with a view of relieving the headache, were of no benefit whatever, even temporarily. The day after their application all the symptoms and weakness were more pronounced, in other words, the disease proceeded onwards towards the fatal termination. The structure of the exudation at the base of the cranium, and the incipient fatty degeneration in the serum of the ventricles, indicate that these lesions were of much longer standing than might be supposed from paying attention to the symptoms of the case.

CASE VI.*—*Acute Meningitis at the base of the Brain—Effusion of Serum into the Lateral Ventricles—Effete Tubercle in the Pons Varolii and Lungs.*

HISTORY.—John Robertson, æt. 35, a discharged soldier—admitted June 25, 1850. He has been of intemperate habits, and latterly, owing to poverty, has had a very poor diet, and been insufficiently clothed. On the 13th he first experienced headache and febrile symptoms. On the 21st there was vomiting, with cough and expectoration, and on the 23d great restlessness and delirium at night. These symptoms have continued ever since.

SYMPTOMS ON ADMISSION.—On admission he is in a state of great prostration. He lies quietly on his back, frequently talking incoherently, but is easily roused when spoken to, and then answers questions sensibly. Countenance pale; eyes suffused; pupils rather contracted. He has no pain anywhere. His hands and arms are in a constant state of tremor, the former engaged in clutching the bed clothes. Evacuations normal, not involuntary; tongue white and dry; deglutition difficult; chest everywhere resonant; expiration prolonged and harsh; little cough at present, and no expectoration; pulse 64, feeble. Has been treated before admission with calomel and antimonials. *To have* ℥iij *of whisky daily with nutrients.* ℞. *Sp. Æther. Nit.* ℥ss; *Mist. Scillæ,* ℥iiiss; *Aquæ,* ℥jss. *M. Sumat* ℥ss *quarta quaque hora. Head to be shaved, and a blister applied.*

PROGRESS OF THE CASE.—*June 26th.*—Passed a restless night, with considerable delirium. To-day is no better. Moist rales audible at the base of lungs posteriorly. Weakness increasing. *To have nutrients. June 27th.*—Has refused all kinds of food and drink. Coma is now coming on. The extremities are cold; face livid; respiration laborious; pulse 60, can scarcely be felt. The urine has been drawn off by catheter, and is quite normal. Bowels not open for two days. ℞. *Ammon. Carb.* gr. xviii.; *Mist. Camph.* ℥iv.; *Solve. Sumat* ℥ss. *quaque quarta hora. June 28th.*—Became gradually weaker, and expired at four o'clock this morning.

Sectio Cadaveris.—Fifty-six hours after death.

Body somewhat emaciated.

HEAD.—The convolutions on the surface of the cerebral hemispheres were somewhat flattened, but not preternaturally dry. The substance of the brain was normal. The lateral ventricles distended with turbid serum, slightly tinged with blood, to the extent of ℥ij. Central substance of brain healthy. The sub-arachnoid tissue at the base everywhere infiltrated with recent coagulated lymph. In the substance of the pons varolii was a tubercular mass, the size of a pea, firm externally, soft towards the centre, and surrounded by a zone of congested vessels. The membranes covering the hemispheres, and other portions of the brain, healthy.

THORAX.—Heart healthy. Pleuræ on both sides, adherent by chronic bands of lymph, especially at the apices of the lungs. Here both lungs were indurated and puckered, and contained several cretaceous and calcareous concretions. Their anterior margins were emphysematous, and the posterior and inferior portions engorged, and the bronchi more or less filled with purulent mucus. Here and there, scattered throughout the inferior portions of both lungs, were masses of old tubercle, converted into calcareous matter, and varying in size from a barley corn to that of a cherry stone.

ABDOMEN.—Abdominal organs healthy.

MICROSCOPIC EXAMINATION.—The turbid serum in the lateral ventricles contained numerous granule cells, and a few blood corpuscles. The lymph at the base of the brain was molecular, with here and there masses of pus corpuscles in a state of disintegration. The cerebral substance around the tubercular mass in the pons varolii was healthy.

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* Reported by Mr. David Christison, Clinical Clerk.

Commentary.—In this case prostration was so marked that stimulants and nutrients were given on his admission, but without the effect of overcoming his exhaustion. It is to be observed, that although formerly of a tuberculous constitution, which had left traces of its existence both in the brain and lungs, he had overcome this to such a degree that on exposure once again to exhausting causes a simple rather than a tubercular exudation was the result. The structure of the exudation at the base of the cranium, and the granule cells in the serous fluid of the ventricles, indicate that the lesion was already somewhat chronic. In this, as well as the preceding case, it appears to me that the original headache and fever indicate the period of congestion and exudation, that vomiting points to commencing, and stupor to more intense pressure from the subsequent effusion.

The seat of meningitis is the so-called subarachnoid cavity, in which there is a quantity of loose areolar tissue, richly furnished with blood-vessels. It generally results that the exudation poured into this cavity, instead of undergoing the transformation into fibres which usually occurs on serous surfaces, follows the law which regulates its passage into pus. Hence I have ascertained that what is generally called a recent layer of coagulable lymph, covering the convolutions in meningitis, is, in point of fact, a layer of pus. That the exudation should not readily be poured out into the cavity of the arachnoid is explicable by the circumstance, that the solid and unyielding walls of the cranium would oppose any tendency to the enlargement of that space. Indeed, the greater the amount of exudation or effusion, especially in the deeper parts of the brain, the more would the two layers of the arachnoid be compressed together, and hence, under such circumstances, the dryness of this membrane in meningitis with effusion.

If, as we have stated, the exudation in acute meningitis be examined microscopically, it will be found to consist principally of pus corpuscles, presenting an unusually molecular character, and associated with numerous loose molecules and granules. In the chronic forms the pus corpuscles are seen to be broken down, and the whole reduced to an amorphous granular mass, more or less mingled with fat granules. The blood-vessels, also, which enter into this mass may frequently be seen undergoing the fatty degeneration. When the ventricles are the seats of exudation, there are generally in the fluid epithelial cells of a globular form, which present various appearances according as they are swollen by endosmose, or have undergone the fatty degeneration and become granular cells. I have also noticed a great variety of changes in the villi of the choroid plexus under such circumstances. Occasionally their epithelial coating is much increased in thickness, and at other times is raised up in the form of small bullæ, being probably the incipient stage of simple cystic formation. They frequently also contain a greater or less number of the amyloid bodies represented, Fig. 349, the connection of which with active disease in the ventricles, however, has not yet been demonstrated.

As to the diagnosis, notwithstanding the efforts which have been made to distinguish meningitis of the convolutions from that of the base, or either of these, from a simple effusion into the ventricles, I have in vain sought for any precise symptoms indicative of the situation of the disease which could be relied on, or which examination of the dead body has not frequently contradicted. Pain in the head, vomiting, drowsiness, and coma, causing slow and subsequently rapid pulse, succeeded by more or less jactitation and convulsion before death, are the leading symptoms. The gradual mode of invasion, and the succession of these symptoms to one another, are also characteristic, and separable from the sudden attacks caused by hemorrhage, and the slow progress of chronic cerebritis. They are all the results evidently of general pressure on the brain, and hence why mere effusion cannot be distinguished from meningitis. The febrile state cannot be depended on as a source of distinction, and the other symptoms are pretty much the same.

Hitherto the treatment of meningitis, whether real or supposed, has been antiphlogistic, but as to any cure having ever been effected by this practice it is impossible to say. The early stage of the disease is generally overlooked, the vomiting and pain in the head, so long as the patient retains his consciousness, seldom leading to a suspicion of meningitis. It is only when exudation or effusion has been poured out in such quantity as to cause drowsiness and stupor that our suspicions are awakened, and thus it is very difficult to understand how bleeding or purging could facilitate its absorption. Besides, we have seen that the tendency of such exudation is to pass into pus; hence favouring the transformation of cell growth, as previously explained, (Section III. p. 267, *et seq.*), is what may be expected to be most effectual. For this purpose time is required, while the vital strength, instead of being lowered, should be supported. It becomes, however, in actual practice very difficult to carry out these indications. The drowsiness and coma greatly interfere with the means we possess of nourishing the patient, because aliment cannot be introduced in sufficient quantity, whilst the depression of the nervous force so disorders the whole glandular system as to occasion a profound alteration of the nutritive functions. Under such circumstances the mucous membranes become deranged, the tongue and throat parched, the stomach contracted, the bowels constipated, and it often has appeared to me that under such circumstances patients literally die of exhaustion from want of food. The tissues become deteriorated, while the absence of volition and sensation, as in cases of fever, favours the sloughing process over the dependent parts of the body, which are continuously pressed upon. All these changes are remarkably well seen in those cases of the disease which occur without any complication, and when the tissue of the brain itself is free from organic lesion. In such instances a man is deprived of his intellectual faculties merely; he is reduced to the condition of an animal which has lost its cerebral lobes; but the man cannot be kept alive in consequence of the pressure on the encephalon deranging the nutritive functions, whereas a bird, after the experiment, may be fed and retain its vitality for months. Still the duty of the medical practitioner is to support the economy as much as possible—to give nutrients with moderate stimulants—to foresee the possibility of sloughs forming on the back and nates, and do all in his power to prevent them—to unload the bowels and bladder from time to time artificially, and thus, as far as possible, counteract their torpid action—and in this way endeavour to gain time, which will enable the exudation to pass through its natural transformations, and ultimately to be absorbed.

It has always appeared to me that the collection of mere serous fluid, whether in the ventricles or over the surface, either with or without exudation, is consecutive on obstruction of the vessels, and is more allied to the dropsies than to the inflammations. Thus, when lymph is poured into the subarachnoid tissue at the base, it so compresses the vessels leading to the choroid plexuses and lining membrane of the ventricles as to induce effusion; in other words, effusion follows, and does not precede exudation. It is the collection of serum which does the mischief, presses on the brain, and causes the somnolence and coma. If so, the occurrence of these symptoms should be regarded as the resulting instead of as the primary symptoms, and analogous to the ascites or anasarca following hepatic or renal disease.* I have occasionally seen in the ventricles of the brain what may be called a desquamative meningitis, occasioned by the same minute changes which cause the corresponding disorder in the kidneys. These pathological considerations are, it appears to me, wholly opposed to the idea of blood-letting and antiphlogistics being beneficial after exudation and effusion has occurred.

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* This view has been singularly confirmed by a case which entered my clinical ward whilst these pages were going through the press. It was that of George M'Leod, æt. 25, a policeman, of sound constitution. A month before admission he experienced headache, which gradually increased in intensity. Nine days before admission vomiting came on, which was frequently repeated after taking food. On admission he was drowsy, and rapidly became comatose, the pulse 60, respirations slow. During the subsequent nine days he was two or three times less soporous, and on one occasion even answered questions confusedly. Latterly the pulse became rapid, and he died without convulsion or paralysis. A post-mortem examination showed the presence of a firm, chronic exudation, upwards of one-eighth of an inch thick at the base, surrounding the basilar and carotid arteries, and infiltrated through the subarachnoid cavity, so as to surround the pons varolii. The ventricles contained ℥ij of clear serum. The indurated exudation, on microscopic examination, was shown to be chronic, and with its contained vessels commencing to undergo the fatty degeneration. The serum contained nothing but a few epithelial cells. In this case cupping, leeches, ice applied to the shaven scalp, and counter irritants, were of no benefit whatever, and the only thing that appeared to do good was unloading the bowels by means of enemata; latterly, brandy and beef-tea were administered. I am of opinion that the exudation at the base was poured out long before he entered the house, but that the subsequent effusion into the ventricles producing pressure on the brain, and causing the coma, came on after his admission.

CASE VII.*—*Chronic Meningitis—Serous effusion into the Ventricles—Tubercular mass in left lobe of the Cerebellum—Cretaceous tubercle in the lungs, with fibrous cicatrix.*

HISTORY.—James Scott, æt. 30, a writer's clerk—admitted October 29, 1849. The only account that can be obtained of him is that he was seized with vomiting about a week ago, and has been ill ever since.

SYMPTOMS ON ADMISSION.—On admission he seems to be labouring under mental oppression. There is considerable deafness and confusion of ideas, so that he cannot answer questions. He does not complain of, nor appears to suffer from any pain. The eyes are somewhat suffused. Tongue furred, and covered with a moist fur. Skin hot and dry. Pulse 70, full. Drinks freely when water is given him. No paralysis can be detected. Other functions normal. *Head to be shaved, and cold applied. A saline mixture.*

PROGRESS OF THE CASE.—*October* 30.—In the same state, the bowels have been freely moved. Some headache, with wandering of ideas. ℥viij *of blood to be removed by cupping from the neck. October* 31.—No relief from loss of blood. Stupor more pronounced, with slight twitchings in the face and hands. At the visit, coma is complete. *To have a turpentine injection*, but he expired about 1 P.M.

Sectio Cadaveris.—Twenty-four hours after death.

Body robust and well formed.

HEAD.—On removing the calvarium the cerebral meninges were unusually dry, and the convolutions somewhat flattened. The lateral ventricles were much distended, and contained ℥ij of clear fluid. Cerebral substance firm and normal. The left lobe of the cerebellum was firmly adherent to the dura mater covering it. On being cut through, there was found a hardened mass embedded in it, the size of a pigeon's egg, resting inferiorly on a thin stratum of the softened cerebellar structure, about one-eighth of an inch in thickness, and of a reddish hue. It was of yellowish colour and cheesy consistence, most dense in the centre. Other portions of the brain healthy.

CHEST.—The pleuræ at the apices of both lungs were coherent by chronic bands of lymph. Immediately below the adhesions on both sides were several cretaceous encysted masses, about the size of peas, surrounded by dark, indurated pulmonary tissue. On the external surface of the apex of the left lung, was a dense fibrous cicatrix, three-fourths of an inch long. The bronchial glands were enlarged, and infiltrated with chronic tubercle, mostly cretaceous. Other thoracic organs healthy.

ABDOMEN.—Abdominal organs, with the exception of the scrotum, which contained some chronic fistulæ, healthy.

MICROSCOPIC EXAMINATION.—The centre and circumference of the tubercular mass closely resembled the figures represented (Figs. 361, 362); but the external softened cerebral substance contained a larger number of granular cells. The serous fluid in the ventricles only contained a few epithelial cells.

Commentary.—In this case, the meninges covering the left cerebellum were thickened and adherent to the dura mater; and below them was found a tubercular mass the size of a pigeon's egg. How long this lesion had existed it is impossible to say, but its presence, by compressing the vessels at the base of the cranium, was well calculated to render any temporary congestion more liable to terminate in effusion. Whatever was the exciting cause, such is what we presume to have occurred, producing dropsy of the ventricles, with the usual symptoms of pressure on the brain, proving fatal. Here we have a further corroboration of such effusions being rather the result of pre-existing lesions, than a direct consequence of inflammation.

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* Reported by Mr. Alexander Christison, Clinical Clerk.

CASE VIII.*—*Chronic Cerebral Meningitis; Induration surrounded by softening of a Portion of the Left Cerebral Hemisphere.*

HISTORY.—Mrs. Swan, æt. 35, wife of a coach-builder, admitted December 8, 1850. She had always enjoyed good health up to four years ago, when, having contracted syphilis, and having taken a large quantity of mercury, she began to complain of headache, indigestion, occasional vomiting, constipation, and drowsiness. About six months ago, she had a fit, from which she recovered in the course of half an hour. She suffered from similar attacks afterwards, at intervals of from two to three weeks. These attacks were ushered in by severe headache, tinnitus aurium, vertigo, and dimness of vision, and they were followed by great muscular debility. During the paroxysms, which lasted for various lengths of time, she was insensible; there were frothing at the mouth, and twitchings of the muscles of the limbs, especially of the right arm. The last fit occurred two months since. Four weeks ago, she experienced, without any accompanying fit or insensibility, a twitching of the muscles of the right arm, together with a feeling of numbness in the fingers of the right hand. She subsequently experienced less power in the right arm, and some numbness in the right leg.

SYMPTOMS ON ADMISSION.—On admission, she appears debilitated and considerably emaciated. There is great mental confusion, and she often wanders. She complains of intense pain in the head. There is, however, no flushing of the face, or congestion of the eyes, and no delirium. There is difficulty and slowness of articulation. The right side of the face is slightly paralysed. The tongue when protruded, is slightly turned to the right side. There is no diminution of sensibility. The power of motion in the right arm is diminished; she cannot close the hand, or hold anything firmly. Sensibility is unimpared. The right leg is not affected with any diminution of muscular power, though there is a feeling of dragging when the limb is moved. The pulse is regular and of good strength; no cough; complains of loss of appetite; tongue moist, white; no vomiting or sickness. Bowels constipated; menstruation is irregular, and the discharge scanty; menstruated last, six weeks ago. Urine muddy, of 1023 sp. gr.; becomes clear on heating.

PROGRESS OF THE CASE.—From this period until the 4th of January 1851, she remained pretty much in the same condition, on some days the confusion of intellect and difficulty of speech being somewhat less than on others. The treatment consisted of the occasional application of leeches, and latterly of a blister to the nape of the neck, and purgatives. On the day mentioned, however, she was found comatose—did not answer questions, though she seemed to know that she is addressed—pupils moderately dilated—respiration stertorous. There was slight twitching of the muscles of the right side of the face. The right arm was rigidly flexed, and offered great resistance when an effort was made to extend it. *January* 5.—To-day appears better. No stupor. Expression not so drowsy. No stertorous breathing. Has spoken a little. Has no sickness or vomiting. There are still occasional twitchings of the muscles of the right side of face. Right arm not so rigidly flexed. *Ordered a purgative enema immediately. January* 6.—Has again relapsed into a state of coma. Breathing easy. Twitching of the muscles of the right side of the face, of the right arm, and occasionally of the right leg, have again presented themselves. Pulse rather full, and slow. Bowels freely opened by the enema. Sensibility in affected parts still unimpaired. *January* 7.—Continues in much the same condition. Does not seem conscious when spoken to. Sensibility still unimpaired. Pulse frequent, and smaller than yesterday. Increased rigidity of the right arm and leg, with occasional twitchings. *January* 8.—Pulse frequent and very small. Breathing not stertorous. Lies on the left side; and the muscles of the neck are so rigid that the head is quite immovable. Apparently sensible, though she can neither hear, speak, nor protrude the tongue. Twitchings still occasionally occur in the right side of face, right arm, and right leg. Right arm rigidly contracted. Died early on the morning of the 9th.

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* Reported by Mr. Henry Thom, Clinical Clerk.

Sectio Cadaveris.—Thirty hours after death.

Rigor mortis well marked.

Head.—There were strong adhesions between the calvarium and dura mater over the vertex, at which place the latter membrane was considerably thickened. The arachnoid membrane covering the posterior half of the left cerebral hemisphere was thickened, dense, and opaque, closely adherent to the pia mater below. This thickening and adhesion existed to its greatest extent over a space about the size of half-a-crown, situated about two inches external to the falx, and at the anterior portion of the middle third of the hemisphere. Here the arachnoid membrane, united with the pia mater, was one-eighth of an inch thick; and the dense layer being carefully dissected off, exposed a discoloured spot in the cerebral convolutions measuring an inch and a half from before backwards, and one inch transversely. The centre of this spot was indurated to the feel, whilst its circumference was soft and pulpy. In the centre there was observed a hard deposit, the size of a pea, of a bright yellow colour, surrounded by a purple areola, passing into a pink colour, and disappearing gradually towards the margin of the spot alluded to. On making sections through this diseased portion, the discoloration was found to extend inwards and occupy a space about the size of a walnut. It contained imbedded in its substance five other indurated masses, varying in size from a millet seed to that of a pea, and similar to the one formerly noticed. The boundaries of this diseased mass internally presented the same colour and consistence as were noticed on the surface, with the exception perhaps that the disappearance of colour was more gradual internally, and passed into a pulpy white softening of the cerebral hemisphere, which extended from it in a straight line until it terminated in the external portion of the left optic thalamus. The two lateral ventricles contained each about half a drachm of slightly sanguinolent fluid, and, in the left one, a vesicle the size of a pea, containing amber-coloured matter, sprung from the choroid plexus. Other portions of the encephalon were healthy.

Chest.—Heart healthy. Valves normal. No adhesion of the pleuræ. The bronchi, when cut, poured out a sero-sanguinolent fluid. Left lung throughout spongy and crepitant, with much pigmentary matter scattered through it. Right lung was non-crepitant and engorged posteriorly and inferiorily, presenting a mottled appearance when cut, from a number of minute granulations scattered throughout.

All the other viscera were quite healthy.

Microscopic Examination.—The yellow indurated masses described as scattered throughout the diseased portion of the left cerebral lobe consisted of a dense aggregation of molecules and granules, without tubercle, pus, or any kind of corpuscle. The cerebral structure surrounding these masses was loaded with innumerable granular cells and masses, which existed throughout the whole discoloured portion of the brain, but became less and less numerous in the internal white softening as it approached the left optic thalamus. Indeed the most internal portion of the white softening near the optic thalamus contained none of them.

Commentary.—This woman, when she first came under my notice, presented in a most characteristic manner the general aspect and symptoms of softening of the brain. The dulness and confusion of intellect, without loss of volition and sensation—the weakness of the right side of the body, and contraction of the right arm—latterly the rigidity of this extremity and the coma, could leave little doubt as to the nature of the lesion, and its seat in the left hemisphere. From the account received of her history, which, however, was not entirely to be depended on, it appeared that for four years previously she had been subject to head symptoms and "fits" of an epileptic character, at all events involving loss of the mental functions, and convulsive movements of the limbs, especially on the right side. This account was confirmed by the post-mortem examination, which exhibited a very chronic thickening and adhesion to the brain of the meninges on the left side, in addition to an inflammatory circumscribed softening, commencing in the circumference of the same hemisphere, and extending inwards to the optic thalamus of the same side. The yellow masses described were evidently a very chronic form of exudation, and it is very difficult to determine whether they originated or followed the meningitis. Certainly they occasioned the surrounding discoloration and exudation, which had extended inwards to the central portions of the encephalon.

As regards the connection of the symptoms with the post-mortem appearances, we can have little difficulty in ascribing the commencing symptoms and "fits" to the meningitis, which increasing in intensity, and causing pressure downwards to the cranial portion of the cord, occasioned the convulsions. The same lesion, conjoined with the external softening and corresponding change of circulation within the cranium, was the cause of the confusion of intellect and stupidity lately observed, whilst the continued irritation originating in the local cerebral inflammation, also operating downwards through the anterior portion of the optic thalamus, and perhaps a portion of the corpus striatum, caused the contraction and rigidity observable in the right arm. It is of course impossible to determine the amount of pressure and its direction, which any lesion may occasion, except from its effect. But it seems to me that this case is an illustration of the correctness of the pathological laws formerly given. The first symptoms are those of excitation, and are paroxysmal; these pass into more permanent symptoms; and as the organic disease proceeds from the circumference to the centre, we observe the intelligence affected most, motion secondarily, and sensation not at all.

CEREBRITIS.

CASE IX.*—*Acute Cerebritis—Abscesses in the Brain—Old Tubercle in various Organs—Chronic Peritonitis.*

HISTORY.—Mary Melville, æt. 22—admitted July 20, 1851. A girl of abandoned character, concerning whom no further information could be obtained, than that she had been drinking to excess, and had sunk into a state of stupor, from which she could not be recovered.

SYMPTOMS ON ADMISSION.—On admission she was insensible, but three hours after being placed in bed, so far recovered consciousness as apparently to understand questions put to her, although she could not articulate. She cannot move the right arm, although the other limbs are moved freely. The eyes are suffused; pupils and eye-brows contracted; general appearance that of prostration. Pulse 120, weak; left hand occasionally applied to the head, as if pain was there; skin cool; breath smells strongly of whisky; breathing a little accelerated, but no abnormal rales. *Head to be shaved, and ice-cold applications to be constantly made. To have* ℥ss *of castor oil in peppermint water.*

PROGRESS OF THE CASE.—*July 21st.*—Was delirious during the night, and still continues violent, raving incessantly, and trying to get out of bed, so that it was necessary to put on the strait-waistcoat. Bowels have not been relieved. Pulse 130, weak. *To be cupped at the back of the neck to* ℥viij. *To have a turpentine injection. July 22d.*—Still delirious. During the night vomited several times. Will take no nourishment. The right arm is occasionally convulsed. Bowels have been freely opened. In other respects the same. *A blister to be applied to the sinciput. Nourishment to be given in small quantities, frequently repeated, with* ℥iv *of wine. July 23d.*—Delirium not so violent during the night, consisting of low muttering. At present seems exhausted. Pulse 126, small and weak. Vomiting occurs now and then, but not so frequently. Blister has not risen. *To continue nourishment, with* ℥vj *wine. July 27th.*—Since last report the violent symptoms and vomiting have ceased, and she appeared to suffer no pain, although the intellect remained confused. She was also observed to move the right arm, as well as the other limbs occasionally. She also took the beef tea, and other nutrients, with wine. On the night of the 26th coma came on, and the pupils were dilated. To-day she is completely insensible, breathing heavily, with tracheal rales; eyelids closed; pupils natural, insensible to light; evidently sinking. Died early on the morning of the 28th.

Sectio Cadaveris.—Thirty-four hours after death.

Body well formed, not emaciated.

HEAD.—On removing the skull cap and dura mater, the arachnoid and pia mater covering the hemispheres are seen to be unusually congested. About the middle of the right hemisphere was a patch the size of a sixpence, of a dirty yellow colour, which, on being cut into, was found to be the vault of an abscess, as large as a walnut, lined by a soft and vascular membrane, and containing one-half ounce of dirty greenish pus. A similar abscess of nearly the same size was situated a little anteriorly, and somewhat deeper, in the anterior lobe. A third abscess presenting the same appearance and contents, the size of a hen's egg, existed in the centre of the left hemisphere, above the corpus callosum, and about one quarter of an inch from the surface of the hemisphere. The walls of these abscesses were somewhat indurated, punctated with red spots, and lined with a fibrinous matter about a quarter of an inch thick, which apparently had not yet undergone the purulent transformation. Other portions of the brain healthy.

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* Reported by Mr. D. O. Hoile, Clinical Clerk.

Thorax.—In the bronchial glands, and at the apices of both lungs, were several cretaceous and calcareous tubercles, surrounded by indurated black pulmonary tissue. Other thoracic organs healthy.

Abdomen.—The peritoneum covering the intestines presented here and there patches of highly vascular lymph, studded with opaque granular lymph about the size of millet seeds. The mesenteric glands were enlarged and infiltrated with old cheesy tubercles. The liver and spleen also contained a few granular yellow deposits. The uterus was retroverted, the os œdematous, and the cavity of fundus filled with a glairy opaque yellow mucus. Fallopian tubes obstructed by an atheromatous substance, resembling broken down and viscid pus. Left ovary somewhat enlarged, and with its fellow covered with Graafian vesicles in different stages of development. Other abdominal organs healthy.

Microscopic Examination.—The pus corpuscles in the cerebral abscesses more delicate and clear than usual, displaying their nuclei without re-agents. They were also mingled with, and surrounded by celloid albuminous deposits. The friable matter inside the lining membrane was composed of minute molecular filaments, and numerous molecules and granules. The membrane itself also had a fibrous basis, involving some nerve tubes, but no appearance of fibre-cells or nuclei. External to the membrane, the cerebral substance, to the depth of about a line, was composed of disintegrated nerve-tubes and granule cells in great abundance.

Case X.*—*Acute Cerebritis—Abscesses in the Brain—Pulmonary Tubercle—Abscess in Kidney.*

History.—John Dods, æt. 19, a butcher—entered the Clinical ward November 9, 1855. Has been in weak health for the last two years. A week ago he was seized with pain in the upper part of the head, not preceded by shivering, or occasioned by any obvious cause. Denies that he had been drinking. Since then he has felt hot and feverish, and says he has vomited frequently, generally about half an hour after eating. The pain has continued, accompanied with ringing in the ears up to the present time.

Symptoms on Admission.—On admission, he complains of racking pains in the upper part of the head, which has prevented sleep for the last two nights. There is constant ringing in the ears ; the eyes are suffused ; face flushed ; speech confused, with difficulty in collecting his ideas. Appetite he declares to be good ; no great thirst ; tongue covered with a dirty yellow fur, white at the edges ; no pains in stomach ; bowels regular ; complains of cough, with slight mucous expectoration ; percussion everywhere normal. On auscultation, slight prolongation of expiration over left lung anteriorly, and at right pulmonary apex harsh murmur with inspiration and prolonged expiration ; nowhere increase of vocal resonance ; pulse 64, feeble ; skin moderately warm ; body emaciated. Other functions normal. *The head to be shaved, and cold evaporating lotions to be constantly employed.*

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* Reported by Mr. R. P. Ritchie, Clinical Clerk.

Progress of the Case.—*November 11th.*—Passed a restless night, but says the cephalalgia is diminished. Pulse still weak; has taken no nourishment. *To have beef tea, and* ℥iij *of wine.* *November 12th.*—Last evening became very restless, and frequently cried out. This morning at two A.M. he screamed out violently, complained of pain in his head, and became incoherent, but when loudly spoken to, gave rational answers. Both pupils were of moderate size, the right slightly dilated more than the left, but contracting equally on exposure to light. At four A.M. he was seized with a general convulsion, preceded by a scream, in which it was observed that the left superior extremity was more rigidly contracted than the right. The right pupil now was more dilated than the left, and both contracted only feebly on exposure to candle light. The convulsion lasted five minutes, and terminated in complete coma, which continued up to the hour of visit. He was then found to be perfectly unconscious, and could not be roused. There were occasional startings of the limbs. The left foot and leg are insensible to the action of irritants, which on the right side, however, occasion slight movements. Respiration stertorous; right pupil more dilated than the left; pulse 120, full. *To be cupped at the nape of the neck, and* ℥viij *of blood extracted. Continue the application of cold to the head.* At eight P.M., having been cupped, the breathing became easier, but the coma continued, and he died at three A.M. on the 13th.

Sectio Cadaveris.—Eighty-one hours after death.

Body emaciated.

Head.—On removing the calvarium, two bulging abscesses were seen, one occupying the anterior and middle third of the right, and the other the posterior third of the left cerebral hemisphere, immediately below the dura mater, which was of a greenish hue. On removing this membrane, the abscess on the right side was exposed, which was of roundish form, measuring three inches in diameter. On the left side the abscess was not quite so large, measuring two and a half inches in diameter. On cutting through these abscesses, they were seen to be embedded in the cerebral lobes, above the corpus callosum. They consisted of several excavations, varying in size from a pea to that of a hazel nut, all communicating with one another, and filled with greenish pus. Their margins presented a smooth, abrupt border, which was considerably indurated, to the depth of one-eighth of an inch, with points of blood here and there scattered through it. The ventricles and all other parts of the brain were healthy.

Thorax.—In the apex of right lung were about half a dozen miliary tubercles, and the pleuræ over these were firmly united by dense chronic adhesions. The upper portion of the middle lobe of the right lung, and the inferior portion of upper lobe of left lung, contained condensed portions of a red brick colour, partly œdematous, and partly pneumonic, evidently of recent formation. The anterior surface of the left lung very emphysematous.

Abdomen.—Abdominal organs healthy, with the exception of an abscess the size of a hazel nut, in the cortical substance of the left kidney.

Microscopic Examination.—The pus in the cerebral abscesses contained pus cells, with delicate walls, floating in a liquor puris crowded with molecules. The indurated margin of the abscesses was composed of a dense aggregation of minute molecules of a light brownish colour, gradually diminishing towards the healthy portion of the cerebral texture, where they were seen to be infiltrated among the tubes.

Commentary.—In these two cases, abscesses were found in both hemispheres, and it will be observed that the symptoms were of the same general character as those of meningitis formerly given.

The only differences observable are the more decided convulsion and paralysis, and the less degree of delirium, somnolence, and stupor. Indeed it may be said to be impossible to distinguish, with anything like certainty, in individual cases, acute exudations poured into the substance of the brain, from those affecting the meninges or ventricles. The reason will be obvious, when we reflect that the phenomena, in every instance, are in fact attributable to pressure on the encephalon, and that if this be rapid and general, it can matter little whether it originate from the meninges or the centre of the cerebral lobe. In the latter case, however, as the disease progresses, there is more liability of the cranial ganglia, connected with motion, being affected, and hence probably the greater amount of convulsion and paralysis.

Lebert,* in an elaborate Memoir on Cerebral Abscesses, in which he has carefully analysed the histories of 80 cases, has come to the conclusion, that what debilitates the individual, causes a predisposition to this affection. Such is also my own opinion, as most of the cases I have seen have been in scrofulous subjects, and more especially such as have laboured under some form of otitis, connected with caries of the temporal bone. In the two cases recorded, effete tubercle was found in the lungs, and the general health was much deteriorated. Very little benefit can therefore be expected from depleting remedies. Hitherto, indeed, almost all these cases have been vaguely ascribed to meningitis, or apoplexy. But as regards diagnosis, we are exactly in the same condition now in reference to meningitis and cerebritis, as medical men were in during the days of Cullen, as to pleuritis and pneumonitis, that is, we cannot separate them. Hence the following summary from Lebert's memoir, as it comprises all that is known with regard to the symptoms, in 80 cases, is deserving attention :—" Sudden headache is the symptom which most frequently first excites attention; it is generally accompanied by febrile symptoms, vomiting, difficult articulation, and convulsive attacks may supervene; the patients become heavy and morose, and show delirium, contraction of pupils, photophobia; numbness and formication may supervene, and apoplectic symptoms may occur; but all these symptoms vary much in different cases. The intellect suffers comparatively little; sensibility suffers more frequently; the headache is more or less intense, generally diffuse at first, and subsequently unilateral. Coma occurs frequently, but often only temporarily. Paralytic states were observed in almost one half of the cases; they were generally local, but showed themselves also in the form of general muscular debility. Diminished articulating power was observed in 10 cases. In regard to the special senses, only the affection of the ears presents any points of importance. No special symptoms are observed in reference to the vascular or respiratory system. Disturbance of the digestive organs showed itself in the form of vomiting in 20 cases; involuntary defæcation occurred towards the fatal termination of 11 cases. The duration of the disease appears to fluctuate from two or three weeks to two months; there is necessarily a difficulty in determining the point, as the commencement can only be approximately fixed. It occurs at all ages; but the greatest frequency prevails between the sixteenth and thirtieth years."*

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* Virchow's Archiv. für Patholog. Anat. Band x.

CASE XI.†—*Chronic Cerebritis; Epileptiform Convulsions; Hemiplegia of the Right Side; Loss of Smell; Blindness of the Left Eye; Amyloid Bodies in the Brain.*

HISTORY.—John Bookless, æt. 48, a plasterer, admitted January 7, 1855. He had enjoyed good health until two years ago, when he first complained of giddiness and gradual impairment of sight, and of smell. Twelve months ago he was attacked with "fits," three or four appearing in the course of the first night. They have occurred occasionally, at considerable but irregular intervals, ever since. His general health had remained good, until the 3d instant, when, about 12 o'clock at night, a violent "fit" appeared, which was repeated from eighteen to twenty times before six o'clock on the following morning. On the 4th and 5th he was comparatively free from them; but, on the 6th, during the night, they recurred more frequently. On the morning of the 7th, it was observed that the right arm and leg were paralysed, and he was sent into the Infirmary.

SYMPTOMS ON ADMISSION.—On admission, it was observed that the body was tolerably robust; that he was hemiplegic on the right side; that the head was obstinately kept turned towards the right side; that speech was slow and thick; and that although conscious, he was some time in framing an answer to a question. *To have ℥j of castor oil.* Careful investigation on the following day elicited the following facts, viz., complete blindness of the left eye—sight in the right eye perfect—smell absent—cephalalgia—frequently applies his left hand to the left side of the head—other special senses normal—loss of voluntary motion over right side, with considerable impairment, but not absence of sensibility—left side normal—pulse 96, full—other functions healthy. Bowels have been freely open, from the action of the castor oil. Whilst I was examining the patient he passed through two attacks of an epileptic character—there was no scream, only a slight groan—the muscles of all the limbs became rigid—the toes and fingers incurvated—the face flushed, and the head tetanically twisted towards the right side—the mouth was drawn somewhat to the left—the left arm and leg convulsed, the right arm and leg rigid and trembling—there was complete loss of consciousness. This state continued about one minute, when the face became pale, there was foaming at the mouth, the rigidity and convulsions subsided, and in another minute he was again conscious and fully restored to his former condition. *To be cupped in the neck to the extent of* 8 *oz.—ice to be applied to the head.*

PROGRESS OF THE CASE.—From this period he lay, in the intervals of the attacks, tolerably tranquil; the evacuations were passed involuntarily; took nourishment without difficulty. The whole of the 12th he was free from convulsive attacks, but on the 13th they returned; pulse 106, soft. *A blister to the neck, and ℥iv of wine.* On the 14th the epileptic attacks returned every ten minutes, until one o'clock in the morning of the 15th. From this time he remained free from them. At the visit he was still conscious, slowly answered questions, put out his tongue, etc. The respirations, however, were slightly laboured, and gradually became more so, until he sank, at 9 P.M., on the 16th.

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* Brit. and For. Med.-Chir. Rev. April, 1857.

† Reported by Mr. W. Gilfillan, Clinical Clerk.

Sectio Cadaveris.—Fifteen hours after death.

Head.—On removing the calvarium, the subarachnoid cellular tissue was infiltrated with serum, which elevated the arachnoid in some places above the level of the convolutions. On slicing the brain from above downwards, its substance was healthy. Both lateral ventricles were distended with clear serum, which, on being carefully removed with a pipette, measured 1 oz. and 7 drachms. The ventricles were somewhat enlarged, but their lining walls healthy. The foramen of Monro was the size of a fourpenny piece, its edges very thin. White substance of the fornix and central portion of the brain healthy. The left corpus striatum atrophied and shrunk throughout, externally of a dull mahogany colour, and, on section, composed of a diffluent fawn-coloured substance, which flowed out, leaving an irregular cavity the size of a hazel nut. Below the left corpus striatum, the optic thalamus presented, on section, a cribriform appearance, over a space the size of a shilling, dependent on chronic enlargement and thickening of small vessels, the open mouths of which, on being cut, were retracted into its substance. In the anterior portion of the right corpus striatum there was also a diffluent softening, occupying a space about the size of a pea. On removing the cerebral lobes from the cranium, a dense chronic adhesion, which it was necessary to cut through, existed between the inferior surface of the left anterior lobe and the dura mater. It involved the optic and olfactory nerves of that side, and extended so far on the right side as to include also the right olfactory nerve. The portion of brain in immediate connection with this adhesion was unusually indurated to the feel throughout a portion of substance in the left lobe, about the size of a nutmeg; but, in the right, confined to a thin layer of cerebral substance externally, about an eighth of an inch in thickness, and about the size of a shilling in its area. On cutting through the indurated substance on the left side, it felt like soft bees'-wax under the knife, was of a very pale straw colour, gradually disappearing, as did the induration into the healthy structure, without any obvious limit whatever. About another oz. of sanguineous serum was found collected in the depending portions of the cranial cavity after the brain was removed. The other portions of the brain were healthy.

Thoracic and abdominal viscera healthy.

Microscopic Examination.—The fawn-coloured softenings in the corpora striata consisted of numerous molecules, granules, granular masses, and cells, mingled with vessels coated with granular exudation, and fragments of the tubes of the cerebral substance. In and around the cribriform alteration of the left optic thalamus, numerous round colourless transparent bodies were observed which refracted light strongly, and were apparently solid. They varied in size, from the 1-1000th to the 1-500th of an inch in diameter. Some contained an included globular body, around which faint concentric circles were discernible. On the addition of diluted sulphuric acid and iodine, they did not give the reaction of starch or cellulose. They were unaffected by water, acetic and nitric acids. Here and there they seemed to split up, not unlike starch bodies. The indurated portion of brain in the anterior lobes presented an obscure amorphous appearance, consisting apparently of the normal elements, infiltrated with a brownish, exceedingly fine, molecular substance. The serum of the ventricles only contained a few epithelial cells, distended with water by endosmose.

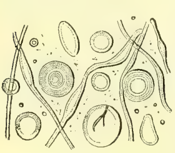

Fig. 365.

Fig. 365. Amyloid bodies with fragments of nerve-tubes, in the cribriform substance of the optic thalamus. 250 *diam.*

Commentary.—The symptoms observed during the life of this man were all clearly explained by the morbid changes demonstrated after death. Before the post-mortem examination took place, I ventured to diagnose chronic softening of the left corpus striatum, with a tumour so situated below it as to press upon the left optic nerve, and both olfactory nerves. Such were the principal lesions discovered, as the indurated brain and dense adhesion may in one sense be looked upon as a tumour, producing the destruction of the special nerves, whilst the extensive lesion of the left corpus striatum sufficiently explained the hemiplegia on the right side of the body. Two other lesions, however, were discovered, viz., 1st, The limited disease in the right striated body; and, 2dly, The effusion of serum into the lateral ventricles and subarachnoid cavity. To the first of these lesions may probably be ascribed the convulsions which more especially attacked the left side of the body, although alone this would be insufficient to account for its paroxysmal character—a phenomenon which, as I have elsewhere endeavoured to explain, can only be referred to congestions within the cranium.* As to the effusion of serum, I am inclined to consider it as having occurred during the last few hours of life;—1st, Because he was conscious within twelve hours of his death, and was free from delirium and stupor; 2dly, Because, after death, little imbibition of serum had taken place into the central white substance of the brain, and there was consequently no softening from maceration.

CASE XII.†—*Chronic Meningo-Cerebritis—Sudden Convulsions—Hemiplegia of Left Side—Softening of Anterior Lobe of Right Cerebral Hemisphere—Adhesions of Arachnoid.*

HISTORY.—William M'Donald, æt. 38, writer's clerk—admitted November 22, 1852. From the account given of him by his friends, it would seem that his habits have been of rather a dissipated nature for several years back. He was never known to have delirium tremens, but about ten months ago was seized with cephalalgia, unusual movements of the shoulders, and inability to speak or write, which symptoms, it is said, soon disappeared. For the last six months also, he has been out of employment, and not eaten more than one meal in the day. On the morning of the 19th, he was seized with a fit, which was succeeded by profound sleep for some hours. The next day he was so far recovered as to be able to walk about, and in the evening he went to the theatre with one of his friends, who, on being interrogated, says, that he did not consider him at that time in his right mind. On the 21st he had another fit, and on the 22d, several others, which succeeded one another at intervals of ten minutes.

SYMPTOMS ON ADMISSION.—On admission, is still labouring under convulsive paroxysms, with loss of consciousness, and foaming at the mouth. These are always present, with the exception of intervals, varying in duration from ten minutes to half an hour, during which the consciousness returns, and he answers questions correctly. When a paroxysm begins, he generally utters a short groan; the mouth becomes twisted, and pulled to the left side; the eye-balls incline to the left side. During the fit the pupils are slightly dilated, and insensible to light; the left arm is thrown into violent clonic convulsions; the left foot is extended and rigid, and the right one firmly flexed. Towards the end of the paroxysm there is foaming at the mouth; respiration is somewhat restrained, not stertorous; there is no appearance of suffocation, nor any marked lividity of the countenance. As the fit passes off, the respiration gradually becomes more free and natural; during expiration, the right cheek is puffed out like a flaccid bag. After recovering consciousness, he can move the right arm and leg voluntarily, but the extremities of the left side are quite powerless and insensible. Pulse 98, full, but not strong. Tongue is moist and clean, and the edges marked with indentations from the teeth. On being protruded, it is turned towards the left side; no distortion of the face during the intervals; urine during the fits is passed involuntarily; bowels open. In all other respects the bodily functions are normal. *Four leeches to be applied to each temple. The head to be shaved, and cold constantly applied to the scalp. To take Pulv. Doveri* gr. x *at bed-time.*

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* See Articles by the writer on Apoplexy, Epilepsy, etc., in the second volume of the Library of Medicine.

† Reported by Mr. Alex. T. M'Arthur, Clinical Clerk.

Progress of the Case.—*November* 23, 7 A.M.—During the night has had frequent convulsive paroxysms, such as have been previously described (66 were counted). The skin never is hot but moist. Pulse 100, full and firm; otherwise the same. *To be cupped on the temples, and* 12 oz. *of blood extracted. To have immediately afterwards an opiate enema.* At the visit the convulsions are almost continuous, with perhaps a minute of interval, and then another minute of violent struggles and clonic spasms. Pulse 120, strong and bounding, increasing in frequency and tensity during the attack. *To be bled to* 15 oz. *and the cold douche applied to the head.* 3 P.M.—Is now unconscious during the intervals. Pulse 160, soft. The fits, which became less frequent after the bleeding, are never as frequent as at the visit. To apply Liq. Ammoniæ, with a view of producing vesication to the occiput. *To have a table-spoonful of brandy every half hour. Sinapisms to be applied to the calves of legs.* 7 o'clock P.M.—Consciousness returned after the first dose of the brandy. The ammonia has only caused redness of the integument. Pulse 120, small and weak. On auscultation of chest a loud moist rale is heard over whole anterior surface of chest. Paroxysms as frequent as before. *Continue brandy at intervals of two hours, with beef-tea. November* 24.—During the night the fits became less frequent, there being often intervals of a quarter of an hour. At 7 A.M. they ceased entirely, when the breathing became stertorous, and stupor came on, from which, however, he could be roused half an hour preceding death, which occurred at 9 A.M.

Sectio Cadaveris.—Twenty-seven hours after death.

Body moderately robust, face and surface somewhat livid.

Head and Spine.—Dura mater rather thicker than usual, especially so over both anterior hemispheres, but in texture healthy. There was a firm adhesion between the dura mater lining the frontal bone and the arachnoid covering the anterior lobe of right hemisphere, over a space 3-4ths of an inch in diameter. The arachnoid membrane everywhere moist. Ventricles do not contain above ʒss of serum. Pia mater and choroid plexuses healthy. The substance of the brain everywhere normal, except at the place in the anterior right lobe, immediately below the adhesion formerly noticed. Here the cerebral substance is softened to an extent about the size of a hen's egg. The grey and white substance cannot be distinguished; and, on section, the morbid portion is of a grey or dirty white colour, of pultaceous consistence, readily disappearing under a fine stream of water. Frontal bone healthy. The spinal cord and its membranes healthy. The other organs could not be examined.

Microscopic Examination.—Numerous fatty granules, granular masses and cells, both loose and accumulated round the blood-vessels of the cerebral softening were visible. The tubular substance also was greatly disintegrated and broken up.

Commentary.—In this case, after cephalalgia more or less continuous, commencing ten months before admission, followed by various perversions of intelligence and motion, caused apparently by drinking, he was suddenly seized with convulsions on the 19th of November, followed by sopor. From this he rallied next day, and was so well as to go to the theatre, although still labouring under a certain confusion of the mind. On the 21st the convulsions returned, and at length became almost continuous and of an epileptic character, followed by hemiplegia of the left side. These at length so exhausted him that he sunk.

When I first saw this man he appeared to me to be in an epileptic convulsion, but the history of the case, and the short intervals of consciousness, during which he was composed and answered questions, pointed to an organic lesion of the brain. The pulse though full was not very strong. Hence eight leeches were applied to the temples, the head was shaved, and cold ice applied. This treatment in no way alleviated the symptoms. Next day the pulse was 100, full and firm. He was now cupped over the temples, and 12 oz. of blood extracted, followed by an opiate enema. Still no benefit. Next day the pulse was 120, strong and bounding. He was now bled to 15 oz., and the cold douche applied to the head, with the result of making him much worse, for shortly afterwards he became insensible even during the intervals. In the evening, therefore, I at once changed the treatment, and gave brandy in table-spoonful doses, with the effect of causing immediate restoration of consciousness and a marked improvement. Stimulants with nutrients were perseveringly continued, but in vain. A post-mortem examination demonstrated a chronic grey softening in the anterior lobe of the right cerebral hemisphere, with old dense adhesions of the membranes over it. The cephalalgia and obscure cerebral symptoms during a period of ten months, were evidently owing to these combined lesions advancing slowly or at intervals. The history informs us that during the last six months he had been out of employment and insufficiently nourished, a condition highly favourable to the disintegrating process in the brain, which at length arrived at such a point as, probably combined with an unaccustomed congestion, to produce violent irritation of the motor nerves, together with such disorganisation and pressure as to occasion hemiplegia.

If this be the correct theory of the case, an antiphlogistic and lowering system of treatment could not be supposed very well adapted to remedy the mischief, to prolong life, or even to alleviate symptoms. The indication generally laid down in practical works on this subject, viz., to bleed when the pulse is strong and full, was here carried out, and failed in the most signal manner. Indeed, the most approved practice was actively followed, with the result of making the patient worse in every particular. When, however, at length antiphlogistics were abandoned and stimulants administered, then, and then only, he rallied and showed for a little, signs of amendment. In no case I ever met with have I been so impressed with the inutility of antiphlogistics, even when the symptoms seemed, from all our past notions, loudly to demand them. Nor after the uselessness of these had been demonstrated, and the patient reduced without benefit, could the value of an opposite practice have been better exhibited. We shall afterwards point out how unreasonable such lowering practice must be in all organic diseases of the brain.—(See Cerebral Hemorrhage.)

CASE XIII.*—*Chronic Cerebritis of the right hemisphere—Cancerous Ulcer of the Œsophagus and neighbouring glands—Fatty Heart.*

HISTORY.—Robert Millar, æt. 72, married—saddler—admitted October 6, 1856. Patient states that, for the last month, he has suffered from pain in the epigastrium and from vomiting, for which he was in the habit of using Gregory's powder. For a week past had vertigo, accompanied by a staggering gait. On the evening of the 5th, his feet were so cold, that he was obliged to use a hot brick in bed; on the morning of the 6th, he found himself deprived of the use of his legs, and was accordingly brought to the hospital. According to the account of his wife, he has experienced considerable anxiety of late; and she thinks that his mental faculties have been slightly impaired in consequence.

SYMPTOMS ON ADMISSION.—It is with great difficulty that the patient can be made to understand a simple question; and his answers are often contradictory. He does what he is bid; speech is slow; there is slight confusion of memory, and want of concatenation of ideas. Sensibility appears to be present in all parts of the body except in the inferior extremities, where the patient states he feels numbness. He has no feeling of prickling or itching. Special sensation appears normal; but he does not see so well as formerly. Complains of tenderness over the spines of the sacrum, on pressure and motion. Has not the power of moving the left inferior extremity; and some difficulty in moving the right. The left arm is somewhat stiff, and he is unable to raise himself in bed. With the exception of an unusual jog with the impulse of the heart, it appears to be healthy. Pulse 50, of good strength. Tongue covered with a whitish-grey fur, but red at the edges. Protruded straight, but sometimes spasmodically jerked to the sides. Passes his urine involuntarily; which is brown, opaque, with a flocculent white sediment; alkaline. Habitually constipated. Face is thin and pinched; skin dry, somewhat cool, especially at the feet. Patient states that he has observed himself becoming thinner during the last month. Other functions normal. *Habeat Pil. Colocynth. Co.* ij *pro re nata.*

PROGRESS OF THE CASE.—*October 8th.*—Power of flexing the left leg has returned to a certain extent, but he is still quite unable to extend it. He can flex and extend the left forearm, but has no power of raising the upper arm on the same side. Bowels quite open; is only able to swallow fluids, and even these in very small quantities; it would appear that matters ingested pass only a certain extent down the œsophagus, and then regurgitate. *October 25th.*—Since last report has continued much the same. Vomiting still continues to such an extent, that everything swallowed is rejected immediately. There is tenderness on pressure in the epigastrium. An inch below, and to the right side of the umbilicus, a tumour of the size of a hen's egg is now felt, which communicates to the hand an impulse synchronous with the arterial pulse; it can, by careful manipulation, be moved to the middle line, or even to the left of it. ℞ *Bismuth. Alb.* ʒj; *Pulv. Opii* gr. iij; *Ext. Gentian liq. q. s. ft. Massa, in pil.* xxiv *dividenda. Two to be taken thrice a day. Habt. enema domesticum. November 18th.*—Since taking the pills the vomiting has been much alleviated and has now ceased. Otherwise he has been in much the same condition as at last report. The bowels have required to be moved by means of enemata and purgatives. *December 2d.*—This morning he expresses himself as greatly relieved, and states that his appetite is much improved. The nervous system now presents phenomena somewhat different from formerly. He answers questions slowly, and is occasionally subject to optical delusions. There is scarcely any perceptible difference between the left arm and the right; the former being used almost as freely as the latter, and presenting little or no appearance of stiffness. He can also move all the joints of the left leg, but with difficulty; stating that it is stiff, and that he has not so great command over it as over the right. Feels a sensation of prickling, which he refers to the affected limb. Is occasionally subject to mental aberration. *December 4th.*—Has been very violent all night, and quite delirious. This morning there appears to be still some aberration of intellect, and occasional optical delusions. He understands, however, what is said to him, and answers intelligently, though slowly. Pupils very much contracted, and when a light is brought close to the eyes, they do not contract further. *December 7th.*—Again vomits his food, usually shortly after taking it. Emaciation great; face pinched. with anxious expression and staring eyes. *Repetantur Pil. Bismuthi cum Opio. Habeat Vini* ℥iv *indies. December 21st.*—Has not vomited since taking the pills. The delirium and excitement subsided shortly after the last report. He again took food and rallied somewhat, and continued in the same state with occasional attacks of excitement towards evening. During the last three days, however, his strength has been gradually diminishing; there has been sopor, and latterly coma, and he died this morning at 7 A.M.

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* Reported by Mr. H. N. Maclaurin, Clinical Clerk.

Sectio Cadaveris.—Fifty-four hours after death.

HEAD.—On removing the calvarium and dura mater, a considerable amount of clear serous fluid was seen to exist in the subarachnoid space, elevating the arachnoid above the level of the convolutions. On slicing the right cerebral hemisphere several small patches of softening were observed. These were met with chiefly in the white matter of the hemisphere, but one or two were seen in the grey matter of the convolutions. The softening was most distinct in the upper part of the hemisphere; and disappeared towards the upper wall of the lateral ventricle. The softened portions were of a pulpy consistence, and of a white colour, with here and there a slight tinge of red or yellow. No such condition existed in the left cerebral hemisphere. Each lateral ventricle was dilated, and contained about an ounce of clear serous fluid. The parts within the ventricles were natural, as well as the rest of the brain and the cerebellum. The arteries at the base of the brain were generally opaque, and in some places rigid, from the presence of atheromatous and a little calcareous matter.

CHEST.—On removing the heart the coronary arteries appeared unusually prominent, and felt hard. The muscular substance was soft and of a fawn colour. The aortic valves were competent, although a little calcareous matter was deposited at the base of two of them. There were one or two minute vegetations on the free margin of the mitral valve. The whole organ weighed 11 oz. On microscopic examination the muscular fibres had in great part lost their sharply striated appearance, and appeared fatty. The lungs were somewhat emphysematous superiorly and anteriorly, with one or two slight puckerings at both apices. On cutting into the pulmonary tissue, a little old tubercular matter and one or two minute cretaceous concretions were found.

Abdomen.—The lower part of the œsophagus felt firm and thickened externally, and on passing the forefinger into its interior, a stricture was found to exist at the cardia, through which it could with difficulty be passed. On laying open the œsophagus an ulcer was found occupying nearly the whole of the mucous surface immediately above the cardia. When spread out, this ulcer was seen to be of an almost regularly circular form, having a diameter of about an inch and a half. The face of the ulcer was depressed; the margins prominent and hard. The base was on the whole smooth, except that from its centre projected a sort of ridge, about half an inch in length, (running parallel to the length of the tube,) of white glistening appearance, and of almost cartilaginous hardness. This ulcer was quite limited to the œsophagus; and its surface was of a dirty greenish colour. The external parts were firmly matted to the portion of the œsophagus corresponding to the ulceration. Two or three enlarged lymphatic glands were here met with. On section of the largest, which was about the size of a hazel nut, it was found to be of firm consistence externally; while internally it consisted almost entirely of a glairy juice of a slightly reddish colour. The mucous membrane of the stomach and intestinal canal was healthy. The other organs, with the exception of a slight degeneration of the kidneys, were healthy.

Arterial System.—Many of the arteries had their coats loaded with atheromatous and calcareous matter. This was especially noted in the case of the cerebral and coronary arteries; and the right common iliac artery was swollen out into a saccular dilatation, more than an inch and a half long.

Microscopic Examination.—The softened portion of the right cerebral hemisphere was composed of fragments of nerve-tubes, with innumerable granular corpuscles, and granular masses coating the vessels. The muscular fasciculi of the heart presented various stages of fatty degeneration. The ulcers in the œsophagus were composed externally of granular matter, in which a few cells in various stages of degeneration were observable. The nature of these were determined by those contained in the neighbouring glands, which abounded in cancer corpuscles, in all stages of their development. The atheromatous matter in the arteries consisted of numerous fatty molecules and granules, associated with a few granule cells, numerous crystals of cholesterine and masses of earthy salts.

Commentary.—When I first saw this case it presented the usual symptoms of chronic softening of the brain, including the failure of memory, confusion of ideas, and diminution of motor power on one side of the body with rigidity. The leading symptoms, however, were constant vomiting, from an obstruction at the cardia, and consequent emaciation and weakness. At first nourishment was carefully regulated and given in small quantities. Subsequently pills of bismuth and opium seemed to alleviate the vomiting, which gradually ceased. He then rallied considerably, was enabled to take food more freely, and became much stronger. The paralysis and rigidity of the affected limbs disappeared, and he walked about the wards maintaining he was quite well. Indeed he several times desired to leave the house. His mental faculties, however, remained confused, he became garrulous, and was subject to optical delusions and intellectual aberration. In this state he continued about three weeks, when he wandered at night, became delirious, symptoms of effusion within the cranium manifested themselves, and the vomiting returned. Again the pills with wine caused him to rally for a little, but his strength gradually diminished, and he sunk. On post-mortem examination, chronic softening of the right hemisphere was found, explaining the effects produced on the left side of the body. The old cancerous ulcer of the œsophagus was very curious, and was evidently in the act of healing up by cicatrization, a fact which will be subsequently alluded to.—(See Stricture of Œsophagus.) The subarachnoid cavity and ventricles were distended with serum, explaining the delirium and sopor which preceded death.

The effects of treatment in this case offer a marked contrast to what was observed in the last one. It was quite remarkable to observe how there followed, on cessation of vomiting and improved nutrition, so marked an abatement in all his symptoms. Even the paralysed and rigid limbs recovered their tone, and he moved about, as if well. On the return of the vomiting, the prostration and nervous symptoms came back, and he again rallied on checking the vomiting and giving wine. No better argument could be furnished that delirium, or other evidence of supposed nervous excitement, is in fact a proof of weakness, and requires for its treatment nutrients and stimulants.

CASE XIV.*—*Paralysis of the abducens oculi and auditory nerves—Exophthalmia—Tumour at the base of the Cranium—Partial Recovery.*

History.—John Wright, æt. 30, typefounder—admitted November 26, 1850. States that four years ago he had a severe attack of rheumatism, soon after which he experienced considerable pain in the right side of the head. His right eyeball then became painful and began to protrude. Hearing also on the same side, was at first dull and then abolished. Ten months after the commencement of the headache, it abated on the right side, but became violent on the left, where it has continued ever since. He was treated with mercury and iodide of potassium. Two years since, he was attacked with spasms and grinding of the jaws, and on two occasions, the convulsions were pretty general and attended with loss of consciousness. His vision has been quite perfect, till about a fortnight ago, when he began to see double. He has continued to work until the 23d inst., when, owing to the imperfection of his sight, he was obliged to desist.

Symptoms on Admission.—On admission, complains of cephalalgia, most severe on the left side. There is complete deafness on the right side. The right eyeball is very prominent; can be turned inwards but not outwards. Vision is perfect in the two eyes, but, from the axis of both not being alike, is double. He cannot lay hold of an object at once, and in attempting to grasp it, his hand is at first directed to one side. There is no other form of paralysis, and the other functions are healthy.

Progress of the Case.—Since admission, this man has presented considerable alternations in his symptoms, the headache being sometimes more severe than at others; and on such occasions, there was considerable stupor, loss of memory, and confusion of ideas. *His treatment consisted of the internal use of the iodide of potassium and purgatives, with counter-irritants externally.* On the *9th of February*, it was noticed that the right eyeball was less prominent. On the *25th* it was ascertained, on careful examination, that he was not perfectly deaf on the right side, and that the right eyeball could be everted more than formerly. On the *1st of March* the prominence of the right eyeball was comparatively slight. He can abduct it fully, and vision is now single. The pain in the head is unabated, but more erratic. By the *15th of March*, the cephalalgia had greatly abated. There was a marked improvement in his general health. Movements of the right eyeball normal—deafness on the right side considerable. Blisters to the temples and neck, and a variety of remedies have been tried, to cause sleep, and diminish the pain; of which M. xij of the Tr. of Cannabis Indica, appeared to be the most beneficial. With the exception of deafness, he was dismissed May 22, quite well.

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* Reported by Mr. Cuningham, Clinical Clerk.

Commentary.—In this case, the deep-rooted cephalalgia, the exophthalmia, the paralysis of the sixth and auditory nerves on the right side, clearly indicated the existence of a solid body pushing out the eye, and pressing on the affected nerves. At one period, also, the motor branch of the fifth pair must have been irritated, as exhibited by spasms of the jaws, while other cerebral derangements occurred. The tumour, however, latterly diminished much in size, as indicated by gradual disappearance of the symptoms:—First, return of the eyeball within the orbit; secondly, recovery of the functions of the right abducens oculi; and lastly, improvement of hearing, with diminution, and then absence of the cephalalgia. The nature of the growth in this case cannot be stated with certainty, but as it was not likely to be a cancerous, and there was no evidence of its being a tubercular formation, so it was more probably a simple exudation.

Acute cerebritis is distinguished pathologically by the exudation of liquor sanguinis into the substance of the brain, which if it be poured out in quantity is transformed into pus; if slowly or to a limited extent, it usually passes into granules and granular cells, and becomes chronic. In the latter case it constitutes one of the forms of softening previously described as exudative softening (p. 303). I have already alluded to the opinion of those who consider this to be a form of fatty degeneration, and have shown how this doctrine fails to explain the occurrence of new cell formation, in the white substance of the brain, where no nerve-cells exist which could undergo the fatty transformation (pp. 229-30). Besides, positive research has convinced me, that however fatty a true inflammatory softening may ultimately become, this is only the result of a transformation of the exuded blood-plasma. Fig. 106 (p. 137) represents this plasma on the exterior of a blood-vessel from the spinal cord, in which a formative process is going on, and I have seen other cases causing rapid death, where, on examination of the brain afterwards, the coagulated liquor sanguinis has been observed in an earlier stage of formation. Thus, in 1843, I recorded the case of a child, John Smith, aged three years, who on the 3d of February 1842 awoke from its sleep with a loud scream; on the following day he vomited repeatedly, and on his admission into the Clinical ward under Dr. Traill, February 12th, presented as symptoms intense headache, constant rolling of the head, contracted pupils, quick and sharp pulse, considerable tremor of the limbs, great restlessness, especially at night, but without convulsion. He died the same night, and on examination, there was no meningitis, no softening, nor serous effusion into the ventricles. The blood-vessels, however, of the fornix and central medullary parts were coated with a fine molecular exudation, (Figs. 366, 367), frequently two and even three times thicker than the vessel to which it was attached, and containing clear round granules, exactly similar to the nuclei of the cells figured p. 137. To argue that such matter is the result of a fatty degeneration of the vascular wall, appears to me opposed to all our positive knowledge, whereas its being a recent coagulation of the exuded liquor sanguinis, and produced coincidently with the violent symptoms, is consistent with every known fact. In another boy, H. B., two and a half years old, whom I saw in private practice, who was previously in good health, the same fact was observable. On the 6th of July 1848, he could not eat his breakfast; at 1 P.M. he vomited; at 4 P.M. febrile symptoms appeared; during the night there was great restlessness with occasional screaming; on the morning of the 7th, there were general convulsions, but principally on left side, and he died at half-past six. The examination was performed by Mr. Goodsir. With the exception of ʒiss of slightly turbid serum in the ventricles, nothing was found in the brain but a yellow discoloration the size of a sixpence on the surface of the right corpus striatum. On microscopic examination, this was seen to consist of the same molecular matter surrounding the blood-vessels, as is represented Fig. 367. These and many other observations, therefore, appear to me a sufficient proof that there is a form of acute cerebritis, consisting of the exudation of liquor sanguinis and the coagulation of the fibrin around the vessels, which may prove fatal very rapidly, especially in children, but that when this occurs in the adult or in aged persons, it has a

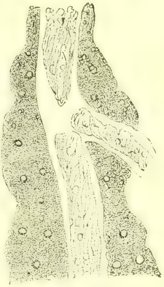
Fig. 366.

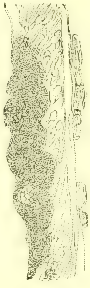
Fig. 367.

Fig. 366. A blood-vessel from the central substance of the brain, coated with a molecular exudation, and with nuclei forming in it.

Fig. 367. Another blood-vessel, with masses of recently coagulated exudation attached to it. 250 *diam.*

tendency to become chronic, and leads to what may be called exudative softening. See p. 303.

Chronic cerebritis so occasioned can only be distinguished with certainty by a microscopic examination. It may present various shades of colour—white, grey, yellow, or fawn-coloured. I have seen white softenings which to the naked eye exactly resemble such as are caused by imbibition after death, but which show under the microscope numerous granule cells in all stages of formation, proving that an exudation and a new growth must have been established before death. In the same way a diffluent grey softening, of the white cerebral substance, which has been regarded by some as atrophic, I have shown by its structure to have originated in an exudation. (Fig. 368.) The yellow and fawn-coloured softenings generally owe their colour to an admixture of blood to a greater or less extent, but are otherwise essentially the same. Hence, as previously stated, I regard the microscopic examination of such lesions to be absolutely necessary to ascertain their nature, and the existence of granule cells in the white substance of the brain as a positive proof of exudation.

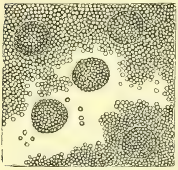

Fig. 368.

We have previously seen that it is a matter of great difficulty to distinguish in the living subject acute cerebritis from meningitis. Neither is it always easy to separate chronic cerebritis from many cases of softening resulting from hemorrhage, or from fatty degeneration resulting from arterial obstruction. The cause of this is obvious, inasmuch as all these lesions, consisting of more or less destruction of the nervous tissue, may be expected to affect the brain in the same manner. In their mode of onset, however, they exhibit a difference. Thus, as a general rule, hemorrhage is indicated by suddenness of attack, whilst uncomplicated chronic cerebritis gradually affects the mental and motor functions in various ways and degrees according to the portion of the brain affected. It must not be overlooked, however, that an inflammatory, a hemorrhagic, and a primary fatty softening may occur together in one individual, as the conditions which occasion one are also favourable to the production of the others. Hence I must refer the reader to the considerations on this point under the head of Cerebral Hemorrhage.

Great discussion has taken place as to whether a chronic inflammatory softening ever undergoes a cure. Durand-Fardel thinks that the curability of cerebral softening is a fact of which we can no more entertain disbelief in the present day, than we can of the curability of

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Fig. 368. Structure of a chronic grey softening of the cerebral hemisphere, resembling chalky milk, entirely composed of exudation, transformed into granules and cells. 250 *diam.*

pulmonary tubercle. Most certainly the observations of Rostan, Cruveilhier, Sims, Dechambre, and Durand-Fardel have fully established the possibility of this occurrence. Besides, why should not a coagulated exudation of blood-plasma into the brain, in consequence of the changes whereby it is broken down and disintegrated, be ultimately absorbed in that organ as well as in any other? It appears to me, however, that the anatomical appearances, by means of which pathologists have endeavoured to *demonstrate* the curability of a softening, are not to be depended on. Durand-Fardel points to the softening resembling chalky milk as a proof of the passage of the lesion into a state of cure, and Dr. Sims described fawn-coloured cavities as evincing the same fact. Now I have seen cases where the grey milky softening was associated with hemiplegia of long standing, but which presented, on microscopic examination, the appearance represented Fig. 368, which although undoubtedly evincing great disorganisation, cannot be said to show signs of healing. The fawn-coloured cavities of Dr. Sims I have not only seen to be filled with granule cells in all stages of formation, but associated with intense recent contraction, on the opposite side of the body. Neither of these lesions, therefore, appear to me to present anatomical proofs of a cured softening. Dr. Todd also believes in the cicatrization of chronic softenings, and even considers that the late rigidity which occasionally comes on in paralysed muscles, is attributable to the irritation which the contraction produces on the neighbouring healthy cerebral substance. Whether the yellowish or fawn-coloured *indurated* spots, very rarely observed in the brain-substance, are proofs of cured softening, it is very difficult to say, for I have seen such indurations crowded with granule cells. (See Case XVII.) Hence the morbid anatomy of cured cerebral softenings is a subject still demanding careful investigation.

The general diagnosis and treatment of chronic cerebritis will be considered under the head of Cerebral Hemorrhage, with which it is often associated.

CEREBRAL DISEASE FROM OBSTRUCTION OF ARTERIES.

CASE XV.*—*Paralysis rapidly becoming general—Old Apoplectic Cyst in right Corpus Striatum—Softening of Pons Varolii—Clot obstructing Basilar Artery—Pneumonia of Left Lung.*

HISTORY.—Alexander Walker, æt. 50—a pensioner—admitted December 3, 1855. According to the account of the patient's brother, he has been long subject to vertigo, both when at home and as a soldier in India. For this complaint he has been bled fifteen times, and always with temporary relief. He has been of temperate habits, and has lately been working in a printer's office, where he was accustomed to carry heavy weights on his head. Yesterday, having undergone unusual bodily fatigue and great mental anxiety in consequence of his sister's death, he was suddenly seized, about 4 P.M., with a feeling of pricking and numbness in his left arm, which commenced at the fingers. Shortly after, there occurred thickness of speech, which rapidly increased. During the night he became speechless, but could make signs, and appeared conscious. In the morning he was conveyed to the Infirmary.

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* Reported by Mr. John Glen, Clinical Clerk.

SYMPTOMS ON ADMISSION.—On admission, there is no sensibility in the left arm, which on being flexed appears peculiarly rigid, though not retracted. On stimulating the left leg, there is evidence of only slight sensibility, and feeble reflex movements. Right arm moves readily on the application of stimuli, but the right leg, though somewhat retracted, is partially paralysed. Left pupil somewhat more contracted than the right one. Face pale, without distortion of the features. Cannot speak or protrude the tongue, but is evidently conscious, listening and watching movements with an anxious expression of countenance. Cardiac sounds inaudible; pulse 88, of good strength; inspirations deep, expirations accompanied with snoring rales. Skin warm and dry. *To have a turpentine enema. The urine to be drawn off by a catheter. Iced-water to be constantly applied to the scalp* (the man's head was bald), *and the following bolus to be carefully placed on the posterior third of the dorsum of the tongue, so as to ensure deglutition.* ℞ *Olii Crotonis. gut.* j; *Pulv. Jalap. c.* ℈i; *Confect. Sennæ, q. s. ft. Bolus.*

PROGRESS OF THE CASE.—*December 4th.*—30 oz. of healthy urine were drawn off yesterday by the catheter. This morning both fœces and urine were passed involuntarily in bed. Both arms and legs are now completely paralysed, and do not move on the application of strong stimuli. Respiration is more laboured; pulse 120, weak; still conscious. *To nourish the patient as much as possible by the mouth, and if necessary, per anum, with strong beef tea. December 5th.*—Respirations still more laboured, and the chest does not expand. The loud snoring with expiration masks the pulmonary sounds, and his position on the back cannot be changed to admit of examination of the lungs. In other respects is in the same state, but weaker; pulse 120, weak. Is motionless, speechless, with the lips slightly separated. On attempting to introduce nourishment by the mouth, the jaws are firmly closed, and matters which are taken cannot be swallowed, although he makes efforts to do so. The water has been drawn off regularly by catheter, and nutritive enemata, with brandy, administered. He is still evidently conscious. *December 6th.*—Since yesterday has been gradually sinking; the cheeks are distinctly paralysed, and distended at each expiration. This morning the left pupil became much more contracted than the right; the corneæ became dim, and the respirations 40 in the minute; the pulse fluttering; coma supervened; and he died at 2 P.M. on the 7th.

Sectio Cadaveris.—Twenty-three hours after death.

HEAD.—Surfaces of the arachnoid moist; slight serous effusion between the sulci of the cerebral convolutions. On slicing the hemispheres, their substance exhibits a greater number of bloody points than usual. They are symmetrical; the right lateral ventricle somewhat smaller than the left. The two contained ℥iij of transparent serum. The right optic thalamus was decidedly larger than the left one, and at its base, near the corpus striatum, presented on section a well-marked cribriform appearance. In the posterior fourth of the substance of the left corpus striatum was a diffluent mass the size of a pea, which flowed out on section, having a small cavity, with the walls of a fawn colour. Both choroid plexuses contained simple cysts, the greater number on the left side. On cutting through the pons varolii, its centre was found softened, and of a pulpy consistence the upper half more than the lower, and the right more than the left side. The whole softened portion was gradually washed away by a thin stream of water, showing a distinct irregular margin, inclosing a cavity about the size of a hazel nut. The basilar artery, throughout its whole course, was opaque, its coats loaded with calcareous and atheromatous matter, and obstructed by a colourless clot, which at one point was transformed into mineral matter.

Spinal Cord.—The spinal cord was carefully examined, and found to be healthy.

Chest.—The inferior lobe of left lung hepatized, of a dirty grey colour, and in the upper lobe two masses of pneumonic condensation about the size of walnuts. Margins of both lungs emphysematous. Heart healthy.

All the other organs were healthy.

Microscopic Examination.—The contents of the old apoplectic cyst in right corpus striatum had disappeared, but the indurated walls consisted of a dense aggregation of brownish opaque molecules, which gradually diminished externally, and were gradually lost among the tubular and granular substance of the striated body. The softened portion of the pons varolii was entirely composed of the disintegrated tubular and vesicular structure of this portion of the encephalon. There were no granule cells or granule masses, such as are found in softening from an exudation. But the nerve-cells contained an unusual number of minute brownish granules, and floated about isolated in the softened substance, as seen in Fig. 364. The clot in the basilar artery contained irregular masses of phosphate of lime, which at one point were so closely aggregated together as in themselves completely to block up the vessel. The hepatization of the left lung presented all the stages of the congestive, exudative, and suppurative stages of pneumonia. These were remarkably well seen in the two masses in the upper lobe, in which the centres were soft and purulent, the air vesicles filled with pus, and the surrounding mass indurated, exhibiting different stages of the transformation of an amorphous exudation into cells. (See Fig. 357, p. 276, which was drawn from a demonstration made from one of these masses.)

Commentary.—After vertigo and other head symptoms for many months, for which he was in the habit of being bled, this man, in consequence of unusual bodily exertion and mental anxiety, was suddenly seized with paralysis in the left arm without loss of consciousness. This was followed by paralysis of speech, and of the other limbs, inability to pass urine or retain the fœces, and spasmodic closure of the jaws. These symptoms indicated a lesion of the central parts of the brain, which, from the suddenness of its occurrence, I supposed would be a hemorrhage either in or pressing upon the pons varolii. But on examination there was found an old apoplectic cyst in the left corpus striatum, which did not appear to have caused any of his recent symptoms, and is not accounted for in his history. The general paralysis was evidently owing to the softening of the pons varolii, and this in its turn was certainly not dependent on an exudation from the blood-vessels, a fact which I ascertained by careful and prolonged microscopical examination. I could not therefore resist the conclusion, that the disorganisation of the nervous substance was attributable to the obstruction in the basilar artery, and a peculiar fatty degeneration commencing in the nerve cells. Of this lesion we shall be able to form a better idea after examining the facts of the following case :—

CASE XVI.*—*Apoplexy—Hemiplegia of Left Side—Convulsive Attacks—Cardiac and Renal Disease—Old Clot in the right Cerebral Hemisphere, with surrounding softening.*

HISTORY.—Elizabeth Ross, æt. 26, married—admitted May 23, 1853. States that about 4½ years ago she suffered from acute rheumatism, on recovering from which she frequently experienced palpitations, and during the last 18 months there has been occasional epistaxis, preceded by giddiness, dimness of vision, and muscæ volitantes. Last January, when quietly sitting in a chair, she suddenly fell to the ground insensible, in which condition she remained 48 hours. On recovering her consciousness, she could not speak; the left half of the body and face was deprived of motion and sensibility. Five weeks afterwards she began to regain her speech and the command of the left arm and leg, but observed at the same time an œdematous state of the feet and legs, and that this gradually spread over the whole body. Three weeks ago she again became suddenly insensible, and continued so 1½ hours, during which time she was much convulsed. She had three similar fits during the succeeding ten days, which were preceded by a choking sensation in the throat, palpitation and uneasiness in the precordial region.

SYMPTOMS ON ADMISSION.—On admission there is still partial paralysis of the left side of the body, which is much colder than the right side. On attempting to walk she cannot raise her left foot completely from the ground, but drags it behind her. She cannot bend her left wrist or arm, or raise them so readily as she can those of the right side. Her mouth is slightly drawn to the right side, and the tongue when protruded appears to be somewhat to the left of the mesial line. The sensibility over the whole left side is somewhat impaired. She complains of uneasiness in the precordial region. Action of heart strong, but rhythm regular. Apex beats between the 5th and 6th ribs, about half an inch to the outer side of the nipple. Transverse cardiac dulness 2½ inches. A blowing murmur is heard with the first sound at the apex, and a double blowing murmur at the base, of which that with the second sound is the loudest and longest, and is distinctly audible in both infra-clavicular spaces. Immediately above the right sterno-clavicular articulation considerable pulsation is visible to the eye, but no tumour can be defined upon manipulation. Over this part a harsh single blowing murmur is audible, and fremitus is very perceptible to the finger. No venous pulsation. Radial pulse 87 per minute, strong and hard, communicating a jerking sensation to the finger. The voice is weak, and articulation difficult and indistinct. Respirations irregular and spasmodic, 20 per minute. No dyspnœa. Cough short; expectoration scanty. Chest resonant everywhere on percussion, and the only abnormal sound audible is a fine moist rattle with inspiration over the two lower thirds of left lung posteriorly. Tongue is red and dry; appetite very bad, and dysphagia to such a degree that she can only take liquid food. Slight epigastric tenderness. Bowels costive. Micturition difficult, painful, and frequent. Urine of pale colour, neutral reaction, sp. gr. 1010, with deposit of triple phosphate on cooling; quantity passed small, and deposits when heated a considerable coagulum. There is general œdema of the whole surface of the body, but especially of the inferior extremities. ℞ *Pil. Scillæ et Digitalis*, vj; *Sumat* 1 *bis in die*. ℞ *Pil. Opii, gr.* 1, *hora somni sumend. Habeat Elect. Laxans* ʒij; *et repetatur post horas sex si opus sit.*

PROGRESS OF THE CASE.—*May 25th.*—Sleeps better. Bowels relieved. Œdema of upper part of body diminished. Urine still in small quantity, highly coagulable, and containing waxy and fatty casts. Heart's action not so strong. *June 6th.*—Since last report has been gradually improving. She can use the extremities of left side more freely, and the sensibility is more acute. Can rise and return to bed without assistance. Speech more distinct. Impulse and murmur over sternum greatly diminished. Heart's impulse more feeble and blowing sounds not so loud. Pulse 90, still jerking. Complains of pain, but without tenderness in right lumbar region. Œdema of lower limbs still considerable, though diminished. Digestive functions normal. Renal symptoms the same. *Has been taking half a grain of the proto-iodide of mercury every night, with mild diuretics and occasional laxatives. June 7th.*—Yesterday afternoon, at 4 P.M., she became giddy and soon fell into an unconscious state, accompanied with convulsions equally strong in the limbs of both sides; screams and moaning. The pupils were dilated and the eyeballs turned outwards and upwards. She had no foaming at the mouth, but frequently shut her jaws with great violence, so that her tongue could with great difficulty be kept from being injured. The attack lasted ten minutes. During the evening she had four other attacks of about the same duration. After each fit she remains for some time in a drowsy condition, and cannot answer questions perfectly. After the first attack six leeches were applied to the temples, and a turpentine enema given. In the evening a blister was applied to the head. To-day is much better. *June 9th.*—Had another slight attack yesterday morning, and a third last night. Paralysis not increased; other symptoms the same. *June 19th.*—Since last report has been complaining of various wandering pains, more especially in right hypochondrium. The gums on the 14th became slightly tender, when the proto-iodide of mercury was omitted. Since the 10th there has been diarrhœa, the bowels having been opened 6 or 7 times daily, notwithstanding the employment of various astringents with opium by the mouth and rectum. About 4 P.M., without any precursory symptoms, she suddenly became unconscious and convulsed. She strained and struggled violently for about fifteen minutes; the convulsions at first being equally severe on both sides, although latterly they were entirely confined to the left side alone. Her mouth was drawn towards the right, and the lower jaw was incessantly carried from one side to the other, with a semi-rotatory motion, as in grinding food. The eyelids remained permanently open, and the eyeballs were carried in an upward and outward direction, in which position they remained during the continuance of the fit. The breathing became slow, sometimes interrupted and irregular, attended with stertor during inspiration, and a puffing out of the cheeks during expiration. There was also foaming at the mouth. These phenomena soon subsided, and the patient was left in a comatose condition. Two hours thereafter these phenomena recurred twice, without the patient in the intervals regaining the slightest degree of consciousness. The fœces and urine were passed involuntarily. During the last attack the inhalation of chloroform was tried, but the breathing becoming more stertorous and hurried, and the pulse intermitting and almost imperceptible, it was instantly stopped. *Abradatur Capillitium; Applicetur Capiti Emp. Cantharid.* 4 × 6. *June 20th.*—Became conscious last night about 8 o'clock, when she could answer questions correctly, but slowly, and in an inarticulate manner. She complains, when interrogated, of great exhaustion and severe frontal headache. Diarrhœa continues and is involuntary. Pulse 90, weak, almost imperceptible. Stupor at intervals. *Habeat Vini* ℥ij *June 21st.*—No return of convulsions. Stools not passed involuntarily as formerly. No pain in head, and says she is free from suffering. Countenance dull and stupid; pupils natural; expression of eye sluggish. Respiration slow and snoring. Over both sides of chest anteriorly, loud moist rales are audible. Pulse 90, very weak. Other symptoms unaltered. *Habeat Vini* ℥iv *indies. Nutritive food and drinks.* Towards evening the mucous rattle in chest became very loud, and the breathing snoring, and occasionally interrupted. No pain anywhere. Could with difficulty be roused to answer questions. Died at 1.30 A.M.

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* Reported by Mr. Joseph Johnston, Clinical Clerk.

Sectio Cadaveris.—Thirty-five hours after death.

Body pale, not emaciated; lower extremities very œdematous.

Head.—The arachnoid membrane presents its natural degree of moisture. On section of the right hemisphere of the brain, a softened portion is situated above and to the outer side of the corpus striatum. It measured 1½ by 1 inch, and extends externally close to the cerebral convolutions. In its centre there is a hard round nodule, about the size of a small hazel nut, of a dark-red colour, with a zone of bright yellow, extending about a quarter of an inch into the softened cerebral substance. This is of friable consistence, and of a yellowish hue in the centre, becoming of an ash-grey tint, and of almost diffluent consistence towards the circumference. Externally the diseased substance gradually passes into the healthy cerebral structure. Arteries healthy.

Chest.—Pericardium distended, containing 3½ oz. of pale straw-coloured fluid. Left ventricle firm, its cavity dilated. The mitral orifice admits the entrance of two fingers; but the anterior segment of its valve has on its external surface a few scattered fibrinous granules, while its posterior-inferior angle is thickened and covered with small masses of fibrin, which extend along the shortened chordæ tendineæ, giving them a fringed appearance. The aortic valves are much thickened, hard and inelastic, especially at their free borders, upon which also a few aggregations of fibrinous granulations are seen similar to those upon the mitral valve. They contain in their interior a small amount of atheroma, which extends into the aorta for about three quarters of an inch. They admit the passage of water through them rapidly, on its being poured upon them from above. The pleuræ on both sides are partially adherent by long bands of chronic lymph. The right pleural cavity contains about six, and the left about three ounces of serum. The lungs are slightly collapsed, flaccid, and imperfectly crepitant. In several places are indurated masses, varying in size from a pea to a hazel nut, composed of infiltrated blood. Other portions of the lungs pour out, from their cut squeezed surfaces, a small quantity of turbid serum, with pus from the smaller bronchi.

Abdomen.—Cavity of the peritoneum contains a considerable quantity of serum. Liver of natural size, but the colour dark from venous congestion. Spleen of firm consistence, 7 inches long by 4 broad. Both kidneys slightly larger than usual, of firm consistence, puckered surface, and stellate irregular vascularity. On section, they present the usual characters of the waxy degeneration. Other abdominal organs healthy. No leucocythemia.

Microscopic Examination.—The central portion of the diseased cerebral structure is principally composed of fibre cells, distinctly nucleated, infiltrated, however, with sanguineous colouring matter, in various stages of degeneration, and mingled with purple and ruby crystals of hematoidine. The more external yellow and grey softenings present granules and granular masses in great abundance, mingled with reddish and yellow portions of disintegrated blood; the latter, with a few crystals of hematoidine, are most abundant towards the centre. Externally the softening is principally composed of disintegrated nerve-tubes, presenting various forms with double lines.

Commentary.—In this young woman vascular disease of the heart had supervened upon acute rheumatism, and vegetations had formed upon the surfaces of the mitral and aortic valves. These vegetations, as we shall subsequently see, are deposits of the fibrin in the blood which may become detached, and be carried by the circulation into more distant and smaller vessels. Four months previous to admission, when quietly sitting in her chair, she became suddenly apoplectic; and on recovering her consciousness laboured under hemiplegia of the left side and paralysis of speech. Five weeks subsequently symptoms of renal disease manifested themselves; then there supervened another attack of apoplexy, followed by a long train of nervous phenomena, which exhausted her strength and caused death. I took charge of the case in the middle of June, by which time she was so reduced that wine and nutrients failed to rally her. On post-mortem examination the arteries of the brain were healthy, but evidence of an old hemorrhage existed, and the question that arises is whether or not this had been caused by obstruction of the middle cerebral artery, from one of the clots derived from the heart? Though this cannot be affirmed, it appears to be very probable. The lesion so produced by its irritating action in the surrounding brain tissue, conjoined with occasional congestions are quite sufficient to explain all the nervous phenomena which followed.

CASE XVII.*—*Two sudden attacks of Apoplexy—Hemiplegia—Cardiac Disease—Persistent Albuminuria—Enlarged and diseased Spleen—Cerebral Softening—Anasarca—Atheroma of Arteries—Obstruction of left middle cerebral artery.*

HISTORY.—James Balfour, æt. 38, a smith—admitted April 13, 1857. The patient has been a man of temperate habits, accustomed to good diet, and in the enjoyment of excellent health for the greater part of his life. For nearly a twelvemonth before admission, his wife had noticed that he was not looking so well as formerly, but he himself had no feeling of illness, and continued to follow his usual occupation until three months ago. At this time, one day, while engaged at his work, he was suddenly seized with headache and vertigo, the pain being so severe as to compel him to return home and go to bed. He became insensible, and remained comatose for three days. On recovering from this state, he found he had lost the power of his right side, and that his features were drawn to the left. His speech was not affected. From this state he gradually recovered, and in four weeks was able to return to work. Three weeks subsequently, while in the act of shoeing a horse, he again suddenly lost to a considerable extent the power of his right side, and his speech now became affected. Since the second attack he has never been able to resume his work; for although he has recovered the power of his right side almost entirely, he has gradually become weaker. For the last five or six weeks his legs have swollen towards night, and during the same period there has been slight diarrhœa, which has increased considerably during the last ten days, but which causes no pain. Two weeks ago he was attacked with severe vomiting, the matters ejected being apparently bilious, and since then he has suffered from pain in the splenic region, especially when he stands or moves about.

SYMPTOMS ON ADMISSION.—On admission, the patient talks in a loud monotonous tone, indistinctly, and with stammering; he cannot whisper, though he can speak in lower tones than usual. When speaking, the voice often becomes whining; he cries and sheds tears without any obvious cause. The sensibility of both sides of face, trunk, and limbs seems unimpaired, tongue slightly protruded to the right side, while the mouth is drawn to the left; when the patient eats, the food lodges in the right cheek; he tastes and feels as well on the right side of the tongue as on the left. The grasp of the right hand is as firm as that of the left, and the patient walks without a limp, but there seems a want of certainty in planting the right foot, and he staggers slightly on turning quickly round. His intelligence and memory are unimpaired. He cannot write now as well as formerly, forgetting how to form the letters; but he can read writing and printing. On percussion, the transverse dulness of the heart is found to be 2½ inches, and for an inch external to this the note is flat. On auscultation at the apex, a blowing murmur is heard with the first sound, and the second is somewhat lengthened. At the base there is a blowing murmur with both first and second sounds. This double murmur is propagated along the great vessels, and is heard most distinctly along the sternum and in the epigastrium. The pulse is 76 per minute, soft and weak. Tongue has a dark coat in the centre, and is furred round the edges; appetite small; food neither causes pain nor inconvenience, and is not vomited. There is considerable tenderness on pressure all over the left side. Has painless diarrhœa, with frequent watery stools of a dark-brown colour, and fœcal odour. Hepatic dulness is not easily determined, but appears about 4½ inches vertically. In the splenic region there is a large area of dulness extending into the abdomen, where a tumour is felt. The dulness commences at the seventh rib, an inch and a half below the level of the nipple, and extends vertically for 8 inches. On pressure over the enlarged spleen the patient complains of pain. When he lies on right side, the upper margin of the dulness is found to be lower than when he lies on the back; the anterior limit does not change. Urine slightly albuminous; contains a sediment, consisting of mucous, squamous epithelial scales and numerous tube casts, chiefly granular, but a few waxy, containing one or two epithelial scales. There is slight pitting on pressure over the feet and ankles. Respiratory system normal. *Ordered an astringent powder to be taken at bed time.*

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* Reported by Mr. T. J. Walker, Clinical Clerk.

Progress of the Case.—The treatment for the diarrhœa by astringent powders was continued until the 20th April with no good result, but the pain in the splenic region has been considerably relieved by the exhibition of a terebinthinate followed by an opiate epithem. Astringents succeeded in arresting the diarrhœa on the 24th, and it did not recur throughout the progress of the case. The amount of urine passed during the week diminished from 62 to 23 ounces, and again increased to 43. From the *24th April* until *May 6th*, the physical signs and symptoms continued much the same, but during this period the urine diminished, the anasarca increased, the aspect became more heavy, the weakness more marked, the articulation more embarrassed, and the ideas seemed to be formed slowly although correctly. No leucocythemia. On *May 7th* there was marked tenderness on pressure in both hypochondria. At the apex of the heart a long blowing murmur synchronous with both sounds still audible, and at the base a double blowing murmur. Great dyspnœa and prostration. Coma. He died the following morning.

Sectio Cadaveris.—Seventy-five hours after death.

Head.—Surface of brain was natural; but the ventricles contained 2½ ounces of clear serum, and their lining membrane was tough, thickened, and almost of a leathery feel. On the surface of the right corpus striatum there occurred two patches (the larger being 2 lines by 1, and the smaller being half that size) of an opaque yellow colour—slightly depressed—quite superficial—not softer, but rather tougher than usual. On the surface of the left corpus striatum, a similar patch, not larger than a hemp seed, occurred. On the inner surface of the lower part of the descending cornu of the left ventricle, there was observed a mass, the size of a small pea, consisting of gritty matter, embedded in a membranous cyst, and surrounded by a soft substance of a dark, reddish-brown colour. The choroid plexuses and other portions of the brain healthy. The middle cerebral artery on the right side, in the fissure of Sylvius, close to its division into two branches, looked opaque and felt firm, being obstructed over the last two lines of its course by a yellowish mass, which also extended one line along the larger of the two branches. The other arteries of the brain and both carotids were healthy, presenting the merest trace of atheroma at the division of the common carotids.

Thorax.—Heart weighed 19 ounces. On the anterior flap of the mitral valve numerous small vegetations occurred in the left ventricle. The aorta at its origin was almost completely obstructed by a mass of vegetations, some the size of a pin's head, others about the size of a small pea, and one nearly as large as a filbert. They were clustered on the ventricular surface of the right and left semi-lunar valves, and on the margin of lacerations in their vicinity which occurred in the endocardium. There was no posterior semi-lunar valve, its substance having apparently been broken away, leaving only a ragged, soft, atheromatous edge close to the aorta. The endocardium was thickened and opaque over the ventricle. The mitral valves were much thickened at their edges, with nodular swellings projecting towards the auricles. The pleuræ contained each two pints of clear, rather dark-coloured serum; the lungs were collapsed posteriorly, and a little emphysematous anteriorly, but everywhere crepitant.

Abdomen.—The peritoneum contained more than a quart of dark-coloured clear serum. In the intestines there was no trace of ulceration, but the mucous membrane of the colon and of the lower part of the ileum was congested. The liver weighed 4 lb. 7 oz., presented congestion of the hepatic veins, but in structure was normal. The spleen measured 7½ inches, weighed 2 lb. 2 oz., and on section presented one-third of its area normal in colour, consistence, and minute structure; but the other two-thirds were of a fawn yellow colour, of firm consistence, without trace of vascularity. The kidneys weighed 14 oz., were of smooth surface, but on section presented portions of a dark red, and others of a yellowish-grey colour. The dark red colour was due to the extravasation of a thin layer of blood.

Microscopic Examination.—The serum in the ventricles contained a few epithelial cells. The superficial indurated patches on the surface of the corpora striata were chiefly composed of numerous granules and molecules, containing many granule cells, closely aggregated together and apparently in a state of disintegration. The gritty matter in the centre of the old apoplectic clot dissolved with effervescence in sulphuric acid (carbonate of lime). The brown matter surrounding it consisted of numerous oily granules, mingled with masses of yellow and brown pigment. The vegetations covering the aortic valves consisted entirely of granular matter, evidently undergoing the fatty degeneration. The yellow portion of the spleen consisted of a translucent substance, in which the normal elements of the organ appeared shrunk and decayed. The kidneys presented the usual appearance of partial fatty degeneration of those organs.

Commentary.—On the entrance of this man into the house, it was recognised that he laboured under obstructive disease of both valves; and it is observable that the history says nothing of his having ever been affected with rheumatism. He had previously experienced two attacks of apoplexy, followed by hemiplegia on the left side, and when he came into the house there were superadded symptoms of cerebral softening, of Bright's disease, and of enlargement of the spleen. I subsequently determined that there was no leucocythemia. On *post-*

mortem examination, organic alterations of the heart, brain, spleen, and kidneys, were discovered. The slight indurations in the corpora striata were curious. They were composed structurally of numerous granules and granule cells, and it may be asked whether they were the results of previous hemorrhagic extravasations, or of exudations. I think the latter, as they appear to have been very chronic in their nature, and not to have been connected with any recent symptoms. The apoplectic attacks and hemiplegia on the right side seem to have depended on the limited hemorrhage, on the inner surface of the descending cornu of the left ventricle. It is true, we have historically an account of two apoplectic attacks with hemiplegia, and only the trace of one hemorrhage. It is observable, however, that the centre of this old clot presented a different structure from its circumference, and that, consequently, the blood of which it was composed may have been thrown out at different times. This, however, is a matter of opinion, and did not admit of demonstration. It should also be noticed that the clot found in the artery of the Sylvian fissure on the right side did not appear to have occasioned any symptoms, or to have produced other structural alteration. These chronic cerebral lesions seemed ultimately so to have affected the circulation within the cranium, as to have caused effusion, the two ventricles being greatly distended with serum, to which the coma preceding death was probably attributable.

The three cases now given appear to me to afford evidence of disease of the brain, being occasioned by obstruction of the arteries, an idea that was distinctly put forth by Carswell and Bright, but the confirmation of which, based on combined pathological and clinical observations, was reserved for more recent observers, and especially for Virchow, Kirkes, Tufnell, and others. This obstruction may arise in two ways,—1*st*, From disease of an artery, causing coagulation of the blood, and obstruction immediately within the portion of vessel affected. 2*d*, In consequence of coagula from the heart becoming loosened, then carried in the course of the circulation, and subsequently arrested in some distant and smaller artery. An example of cerebral disease produced in the first way is observed in Case XV., and illustrations of the second mode is given in Cases XVI. and XVII.

Gulliver was the first to demonstrate that the so-called ossification of arteries, commonly observed in old persons, was in fact a fatty degeneration of the vessels, consisting of numerous oil granules and crystals of cholesterine, accumulated between their coats, and frequently associated with deposits of earthy salts. This disease of the arteries, however, is a true arteritis (Donders and Jansen), originating in an exudation between their coats, from the vessels which supply them, which exudation subsequently undergoes the fatty degeneration. This lesion induces slight constriction of the vascular calibre, thickening of the arterial wall, and occasional roughness of the internal surface—

circumstances which favour coagulation of the blood at the part, and cause more or less obstruction. In chronic cases the vessel becomes brittle, and hence, on any unaccustomed exertion, it gives way, and occasions hemorrhage. These obstructions and ruptures of the vessels from chronic arteritis, are the most common causes of chronic cerebritis and hemorrhagic apoplexy. The case of Walker, however, (Case XV.) demonstrates another mode in which softening may be occasioned. Here obstruction of the basilar artery had occurred, occasioned by a local arteritis, and subsequent mineral degeneration of the clot. The result was a peculiar kind of softening, which as the sole lesion of the cerebral substance, I observed in this man for the first time. In the pons varolii the tubes and nerve cells were loosened and easily broken down, without any exudation from the vessels, granules, or granule cells, such as are observed in chronic cerebritis. The nerve cells, however, were enlarged, and contained an unusual number of small fatty molecules, forming masses of various sizes, so as to constitute a partial mould of their interior. Many of these masses were naked and swam about in the fluid, but were easily recognised by their shape to have originally been formed in the interior of cells. (Fig. 364.) I have frequently seen this alteration associated with exudative and hemorrhagic softenings; but as constituting the *sole* lesion, and occasioning an extensive softening, producing such undoubted symptoms in the living body, this is the only case, so far as I am aware, in which it has been clearly described. It appears to me to consist of a primary fatty degeneration of the nerve cells, and to depend upon altered nutrition of the part; a condition hypothetically put forth as a cause of softening by Delaberge and Monneret, but now for the first time demonstrated.

That foreign solid bodies floating in the blood would obstruct the smaller vessels and occasion exudations, was first shown by the experiments of Magendie, Cruveilhier, Gaspard, and others, who injected starch, quicksilver, and various substances into the blood, with the effect of producing fatal inflammations. Cases by Virchow, Kirkes, Tufnell, and others, have further shown the probability that the coagula and so called vegetations formed in the interior of the heart, may in like manner be occasionally loosened, carried by the blood to a distant part, such as the brain, lungs, or extremities, and become impacted in a distant artery. If so, they may, by causing obstruction, induce hemorrhage, exudation, and perhaps the kind of lesion from diminished nutrition of which I have just spoken. Many cases are now on record, and Cases XVI. and XVII. are good examples of them, where, in conjunction with valvular vegetations in the heart, clots have been found in the arteries leading to important organs, causing in the same individual cerebritis, pneumonia, nephritis, splenitis, etc. etc. But although it is certain that solid plugs may block up arteries and occasion serious results, it is by no means clear that all the instances of disease which have been cited as proof of this in the living body really depend on arterial obstruction, or that, because cerebral hemorrhage and softening or pneumonia are, as is well known, common sequelæ of diseased heart, that therefore plugs of coagulated fibrin, derived from the last named organ, should originate these secondary lesions. I need scarcely point out that increased or diminished impulse of the heart itself, arising from hypertrophy or fatty degeneration of its fasciculi, are equally powerful causes of cerebral disease, and that this in its turn very commonly occasions pneumonia by its paralysing influence on the vagi nerves. Besides, although clots are often found in arteries, associated with cardiac vegetations, I am not aware of any facts which demonstrate that the clot originating in one place is the identical clot which has been found in another. Much stress has been laid upon the form of the clot, the broken-off looking appearance of its ends, its structure, etc. etc. It has been supposed that whilst spontaneous coagulations, or such as are induced by arteritis, are gradually converted into fibrous tissue, those coming from one place and impacted in a vessel at a distance, break down and undergo a disintegrating process. Attempts even have been made to show that the broken ends of impacted coagula correspond with and fit the surfaces of other coagula in the heart, or on the cardiac valves from which they have been supposed to originate. All I shall say with regard to such arguments is, that numerous investigations into the structure of coagula under a variety of circumstances have convinced me that we possess no certain means of distinguishing one clot from another, and that all such statements should be received with great caution. Otherwise, every case of apoplexy and softening will have to be ascribed to wandering coagula.

At the same time the probability of this occurrence is so great, and its explanation of certain facts so simple, that it has every claim to be entertained in practical medicine. Thus cases have occurred where the pulse of an artery has suddenly stopped, followed by more or less numbness and coldness of the parts to which it led. Tying arteries has produced similar effects. Fragments separated from the aortic valves would readily pass into the carotids or vertebrals, especially the former, and become impacted in the cerebral arteries. Hence local congestions, causing headache and other symptoms, followed by exudations and hemorrhages, producing convulsions or paralysis. In the same manner, coagula formed in the right side of the heart may pass into the branches of the pulmonary artery, causing pneumonia more or less extensive. Spontaneous coagulations also may occur. Thus, in the spring of 1856, Professor Miller asked me to examine a clot which formed a mould of the pulmonary artery, and was unusually firm and fibrous. It had apparently occurred during life, in an elderly gentleman, who was suddenly seized, when in a warm bath, with symptoms of oppression in the chest and dyspnœa, and shortly after died. On examination no other lesion could be discovered but the clot referred to. Similar cases of sudden death owing to a like cause have been recorded by Paget, Virchow, and others. The true lesion in all these cases is obstruction of the vessels, however produced, whether by coagulation of the blood from unknown causes, by arteritis or aneurisms causing clots to form within the vessel, or by such clots travelling from one place to another, which, however, I am disposed to think has very rarely been demonstrated. Virchow has sought to elevate this simple matter into pathological doctrines, under the names of *Thrombosis* and *Embolismus.*

CEREBRAL HEMORRHAGE.

CASE XVIII.*—*Apoplexy, followed by Hemiplegia of Left Side—Recovery.*

HISTORY.—Andrew Bryce, æt. 72, tailor—admitted Jan. 29, 1851. He states that on the 9th October last, while walking up Dundas Street, he suddenly felt very dizzy, and was obliged to sit down. He lost his senses completely for several minutes, and when he again became conscious he found he could not walk. He was assisted home, and on the afternoon of the same day admitted into No. 10 of the Royal Infirmary. He was freely purged, and has been confined to bed ever since. Since his admission he has been gradually gaining power in the paralysed side.

SYMPTOMS ON ADMISSION.—At present he complains of occasional frontal headache, increased during cold weather. His intelligence is unaffected. The special senses also normal. He cannot raise himself into a sitting posture. He can move the left hand, but is unable to direct it steadily to a distant object; neither can he place it on the top of his head. While in bed the left leg moves as perfectly as the right, but he cannot stand upon it. The sensibility of the left leg appears to be at present normal, but that of the left arm is slightly impaired. There is also a little rigidity of the left arm. The tongue is protruded in the median line. On laughing, the mouth is drawn slightly towards the right side. Sensibility of the face unimpaired. The pulse 88; is of natural strength. The urine is not so copious as formerly, and is made in a smaller stream and more frequently. He has sometimes passed gravel, and observed his urine of a high colour—sp. gr. 1023—non-albuminous—a copious deposit of phosphates.

PROGRESS OF THE CASE.—This man remained a few days in the ward, during which no change occurred in the symptoms, and on Feb. 7th he returned to No. 10, from which he was dismissed with the power of the left side nearly restored May 13, 1851.

CASE XIX.*—*Apoplexy followed by Hemiplegia of the Right Side—Recovery.*

HISTORY.—Anthony Caron, hairdresser, a Frenchman—admitted Feb. 6, 1851, in a state of coma, in which condition he was found lying on the Granton road, and was immediately brought to the Infirmary.

SYMPTOMS ON ADMISSION.—When first examined, he appeared to be about fifty years of age, and of robust habit of body. He was perfectly unconscious of surrounding objects, and as if in a deep sleep — the surface pale, the countenance calm, and respirations natural. The mouth was slightly drawn to the left side. The right arm, allowed to fall down after being raised, sunk rapidly like an inert mass—

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* Reported by Mr. Cuningham, Clinical Clerk.

the left, similarly treated, fell slowly. Pricking the right leg and foot caused no shrinking of the limbs; but the left limbs when pricked were rapidly withdrawn. Pulse 60, rather full, but, considering his habit of body, probably of natural strength. On returning to him an hour after the first examination, consciousness had to a considerable extent returned. He opened the mouth when asked to do so, and the tongue was ascertained to be covered with a white fur. He also raised the left arm and leg readily, but could not move the limbs on the right side. The pulse remained the same. In consequence of this change in his condition, the full bleeding which was previously determined on from his arm, was changed into the removal of ℥xij of blood, by means of cupping, from the nape of the neck. *He was ordered a pill containing Ol. crotonis M.* i, *and ext. colocynth*, gr. v, to be taken every four hours until the bowels were freely moved. Cold was to be applied to the head, and the most perfect quietude enjoined.

Progress of the Case.—The following day he was much better—consciousness had returned, and from this time he gradually improved, and was dismissed May 17, the arm having somewhat recovered its motion, but with the leg still lame and paralysed.

Commentary.—The term apoplexy has been used in two senses. By the older writers and clinical observers, it was used to denote a sudden loss of consciousness and volition, independent of the various morbid lesions which may occasion these symptoms. By the followers of the French school of pathology, the same word has been applied to an extravasation of blood into an organ; and hence the terms apoplexy of the lung, apoplexy of the spinal cord, apoplexy of the kidney, etc. Ecchymosis of the skin, the result of a contusion—such as is present in what is commonly called a "black eye"—is in this sense an apoplexy. I believe it better to adhere to the meaning of our ancestors, the more so as it is not always possible to determine when a cerebral hemorrhage is present. Hence the two cases which have been given, characterised by sudden loss of consciousness and volition, coming on spontaneously, are called apoplexy. But should such cases prove fatal, and we are enabled to speak positively as to the cause of the apoplexy from post-mortem examination, then we may denominate them with more propriety cerebral hemorrhage, softening, etc. etc., according to circumstances.

In the two cases before us there is great similitude—both were seized suddenly with apoplexy while walking. In the first case, however, the apoplectic state was of a few minutes' duration; in the second, it continued several hours. The one case occurred between three and four months before it came under observation; in the other, he was seen in the apoplectic condition, or immediately after he emerged from it. In both there was perfect hemiplegia; but in the one case there has been complete recovery of sensation and partial recovery of motion, as regards the affected side. In the other, both sensibility and motion are still completely lost.

On examining Case XIX., the practical question to decide on was whether he should be bled? But the patient shortly after exhibited signs of coming out of the apoplectic condition, and it was clear, therefore, that the pressure on the brain was spontaneously diminishing, the pulse was steady and of natural strength. How could a bleeding have benefited him? The chief point here, therefore, was not to interfere with the operations of nature, but assist her as much as possible in the operation she had next to perform—that is, causing absorption of the clot. This I presume to be best accomplished by quietude, by the avoidance of all circumstances which could excite the heart's action, regularity of the excretions, and moderate diet. These, are, therefore, the measures which were adopted, and his recovery, though slow, was satisfactory.

CASE XX.*—*Palsy—Hemiplegia of Left Side—Recovery.*

HISTORY.—Jessie Fleming, æt. 45, single, milliner—admitted Nov. 27, 1856. Since last May the mind of patient has been in an unsettled state; previously she enjoyed good health. During last summer her digestion was much impaired, and she suffered from severe cramps in the left leg, especially during the night. On Friday last, Nov. 21st, while engaged at her work, she suddenly fell down, and though retaining her senses, felt unable to rise without assistance; shortly after she quite lost the use of the left side. When put to bed, she experienced great pain in the head for which she was cupped over the back of the neck, to the amount of 13 ounces; and next day a large blister was applied to the same part; two pills were taken every three hours till her bowels were freely moved. On Nov. 23, leeches were applied to the temples, and on the 24th she applied for admission.

SYMPTOMS ON ADMISSION.—Great pain is felt over the top of the head, which is constant, and prevents the patient from stooping. Speech thick and imperfect. The muscles of the left superior extremity are completely paralysed, and do not admit of extension; the muscles of the head and face are not affected, nor is sensibility impaired. Cannot move the left leg, but on applying an irritant to the sole of the foot, the limb is at once retracted. Pulse 120, of good strength; other symptoms normal. *The head to be shaved, and ice to be applied to the scalp. To have a purgative bolus.*

PROGRESS OF THE CASE.—On the following day the pain in the head was much relieved, and from this time she slowly regained the use of her arm and leg. Her recovery, however, was retarded by a carbuncle which formed over the right interscapular region, and subsequently by an exanthematous eruption, accompanied by considerable fever. She was dismissed April 8th, when she could walk with the aid of slight assistance, and move the arm of the affected side without difficulty.

Commentary.—In this case sudden hemiplegia occurred without loss of consciousness, when the individual was wide awake and performing her household duties, a fact which was established by frequent interrogation and by the accounts of others. It may be presumed that a vessel had suddenly given way, causing hemorrhage into the right cerebral hemisphere. The clot must have been larger than in the last case, not only because the paralysis was more extensive, but from the longer time necessary for recovery.

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* Reported by Mr. M'Arthur, Clinical Clerk.

Case XXI.[*]—*Sudden Paralysis of Face and Left Arm—Pneumonia—Bright's Disease—Recovery.*

History.—Christina Hutchinson, æt. 40, married, a sempstress—admitted November 7, 1854. She states that on the 5th inst., at half-past 1 o'clock A.M., on waking from sleep, she found it impossible to lift the left arm, and had lost the power of speech. She also experienced intense general headache, as well as great pain in the right side of the face, which was greatly swollen. She does not know whether she was insensible previously. On the preceding evening she had gone to bed healthy and strong, though with a sense of fulness in head. Though habitually enjoying good health, she has occasionally had palpitations, with dizziness of the head, dimness of sight and tinnitus aurium, especially brought on by stooping. Seventeen months ago she had an attack of acute rheumatism.

Symptoms on Admission.—Her speech is somewhat embarrassed, and her intelligence dull, though quite conscious of surrounding objects. Hearing perfect. Sees dimly. Left pupil does not contract so readily on exposure to light as the right. The face is dragged to the right side. Cannot lift up the left arm, though she can move it slightly, by a strong effort of volition ; neither can she grasp an object firmly with the left hand. Sensibility of the limb much diminished but not lost. The left leg and side unaffected. Tongue when protruded seen to be loaded and apparently turned to the left, although this is really owing to dragging of the mouth to the right side. Deglutition, especially of liquids, difficult. Bowels constipated. Slight pain in the loins. Urine slightly coagulable, sp. gr. 1014. Pulse 86, small and weak. Heart normal. Other systems healthy. *A blister to be applied to the nape of the neck. To have Ol. Ricini,* ℥ss. *Quietude and rest enjoined.*

Progress of the Case.—*November* 14.—Since admission has gradually recovered her intelligence and power of speech, the features of the face are less distorted, and the sensibility in the left arm has been augmented. There has been constipation, which required pills of colocynth and croton oil to overcome. To-day complains of a sharp pain in the left lateral region of the mamma, increased on deep inspiration. The dulness on percussion but slight ; sibilation audible on auscultation. *November 28th.*—Since last report, has had an attack of pneumonia, involving two-thirds of the left lung, and characterised by all the signs and symptoms of that disease. (See Pneumonia.) To-day she has completely recovered, the pulmonary disease has passed through its usual course, leaving her, however, weak and thin. The appetite is now good, the strength improving. The sensibility and power of motion in the left arm nearly restored. Dragging of the mouth nearly disappeared. *December 11th.*—Since last report all trace of the pulmonary disease has disappeared. A week ago, however, she experienced considerable pain in the lumbar region, and on examining the urine it was found that the albumen had greatly increased. To-day microscopic examination demonstrates in addition numerous fatty and waxy casts of the tubes. Urine pale, passed in good quantity, sp. gr. 1010. She states that the ankles swell towards evening. *Habeat Pot. Bitart.* ℥j *ter die. January 1st.*—Has been gradually gaining strength ; all trace of the paralytic attack has now left the face and arm. Careful examination of the left lung can detect no remains of the pneumonia. The urine is still coagulable on the addition of heat, but much less so than formerly. But it contains no casts of the tubes, is passed in good quantity, and the œdema of the feet has disappeared. Dismissed at her own request.

Commentary.—The peculiarity in this case was the sudden occurrence of palsy in the left arm and left side of the face during sleep. This was most probably owing to a limited hemorrhage compressing the origin of those nervous filaments more immediately in relation with the nerves supplying those parts. Such hemorrhage was not likely to have been extensive, as we may assume that recovery followed on the gradual absorption of the clot. It is worthy of observation, that this woman had formerly suffered from an attack of acute rheumatism, and was liable to palpitations of the heart. On admission, no valvular lesion could be discovered, and yet there supervened many of those phenomena supposed to result from coagula in the blood, causing first cerebral hemorrhage, then pneumonia on the left side, then renal disorder. The occurrence and gradual recovery from each of these diseases in succession is rarely observed.

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[*] Reported by Mr. O. Beaugeard, Clinical Clerk.

CASE XXII.*—*Apoplexy—Extravasation of Blood into the left Corpus Striatum—Pneumonia—Arrested Tubercle of Lung.*

HISTORY.—Isabella Bain, æt. 59—admitted May 20, 1855. She was brought to the Infirmary by some policemen, who had found her insensible in a common stair. They supposed she was in a state of intoxication. Her daughter, however, said this was impossible, as she was a very sober woman, and had always been quite healthy, and had left her house only a quarter of an hour previous to the time she was discovered insensible.

SYMPTOMS ON ADMISSION.—On admission she was completely comatose; the breathing stertorous; pupils contracted; countenance pale; pulse 120, weak and irregular. *One drop of croton oil was administered immediately on a piece of sugar, and afterwards a turpentine enema.*

PROGRESS OF THE CASE.—*May 21st.*—Coma continues. The enema brought away some scybalous fœces, and she has since had several loose stools, which were passed in bed. There is now complete paralysis of the right side, and the mouth is strongly drawn to the left side. Head to be shaved, and cold constantly applied. *May 23d.*—Has continued insensible. She now breathes with difficulty, and with heaving of the chest. There is marked dulness over inferior two-thirds of right lung, but no murmurs are audible there, in consequence of the stertor. *May 24th.*—Slight occasional movements have been observed in left arm. In other respects the same. Paralysis of right side of face well marked. Loud moist rattles are now audible over right side of chest. Dyspnœa more urgent. *Blister to the head.* Died at two A.M. on the 25th.

Sectio Cadaveris.—Thirty-four hours after death.

HEAD.—The arachnoid membrane covering the convolutions, considerably elevated above the sulci, in consequence of fluid in the subarachnoid cavity. The veins covering the hemispheres everywhere turgid with blood. On slicing the left hemisphere from above downwards, the knife passed through a clot of blood in its centre, about the size of a walnut. The left lateral ventricle was also filled with recent coagulated blood and sanguineous fluid. On removing the brain, and cutting through the diseased parts, it was seen that the seat of extravasation was the left corpus striatum, the posterior third of which was broken up, and reduced to a pulpy consistence of a red colour. It was surrounded by a zone of hemorrhagic purple spots, closely aggregated together, extending half an inch into the surrounding white substance, and this again surrounded by another zone of a gamboge yellow colour, gradually dying away into the healthy white structure of the cerebrum. The choroid plexuses both contained several cysts, one or two of which were the size of large peas, and filled with an opaque yellow fluid. The vessels in the Sylvian fossæ were unusually large, thick, and rigid, from atheromatous deposit. The right hemisphere was normal. Some of the more fluid portions of the clot on the left side had infiltrated itself below the cerebellar arachnoid, and was accumulated in a thin layer over the convex margin of the cerebellum on both sides.

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* Reported by Mr. D. Macgregor, Clinical Clerk.

Thorax.—A few atheromatous patches on the lining membrane of aorta and of the mitral and aortic valves. The heart was healthy. The pleuræ on the right side were universally adherent by chronic adhesions. The two inferior lobes of the right lung were hepatized, readily sinking in water, with a few scattered tubercles. The apex was œdematous and spongy. The apex of right lung was indurated, strongly puckered, of blackish colour, and contained several cretaceous and calcareous concretions, varying in size from a pin's head to that of a small walnut. The rest of the lung was spongy, but at the base were two or three masses of chronic tubercle the size of filberts, surrounded by a dark ring of pneumonic condensation.

Abdomen.—Abdominal organs healthy.

Microscopic Examination.—The softened portion of cerebral substance surrounding the clot consisted of disintegrated nerve tubes and blood globules, and contained no granule cells. The opaque fluid in the cysts of the choroid plexus contained numerous delicate cells, globular in form, and varying in size from the 1-2000th to 1-500th of an inch in diameter. They contained a single nucleus, also varying in size, sometimes clear, at others containing numerous granules. There were also numerous irregular masses of granules and mineral bodies, which, on the addition of nitric acid, were rendered very transparent, whilst the larger ones presented a series of concentric rings surrounding a nucleus. They resembled the amyloid bodies so commonly found in the choroid plexus. (See Fig. 349).

Commentary.—This case is an example of death from primary hemorrhage into the left ventricle and corpus striatum, the result of chronic arteritis. She died five days subsequently, during which period a pneumonia had been developed in the right lung, one of the most common sequelæ of severe lesion at the base of the brain. The woman was apparently in good health previous to the attack, which was induced by ascending a stair.

Case XXIII.*—*Apoplexy—Hemiplegia of left side—Hemorrhage into right Cerebral Hemisphere—Diseased Heart—Pneumonia.*

History.—Margaret Wales, æt. 55, married, admitted January 10, 1849. On the first instant patient and her husband left their home quite well, and walked about the streets for about two hours, when, feeling cold, they entered a spirit shop and drank each a glass of whisky. On leaving the shop she suddenly fell down on the left side, insensible. Next morning she began gradually to revive, being evidently conscious, though not speaking. Her friends say that she remained quiet in bed, with the eyes mostly closed. There was no distortion of the face.

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* Reported by Mr. James Struthers, Clinical Clerk.

The right arm and leg felt very cold, but were frequently moved. The left arm and leg of natural temperature, but completely paralysed. On the evening of the 4th she became delirious, muttering and roaring out. This continued until the 7th. During this time she was seen frequently to move the right arm and leg, but not the left. On the 8th was somewhat drowsy, but so far conscious as to speak when roused. On one occasion asked for a glass of whisky, but had some tea given her. In the evening of this day again became comatose, and has continued in this state until admission. Has had no medical attendance, and the bowels, it is said, have not been relieved since the attack.

Symptoms on Admission.—On admission the face, hands, and feet are cold, and of bluish aspect, not unlike that of cholera. The trunk moderately warm; eyelids closed; pupils slightly contracted, and insensible to light. She is quite insensible, the strongest stimuli failing to rouse her. There is considerable dyspnœa (respirations 40 in the minute); no stertor, but some tracheal rales; pulse 100, soft and small. Bronchial moist rales are very general on auscultation over anterior surface of chest, which is also resonant on percussion, with the exception of lower half of right chest, where there is comparative dulness. Heart's sounds are weak, and masked by bronchial rales. The right arm and leg, on being pinched, move slightly, but the left arm and leg are completely paralysed. The left side of face also completely paralysed, but no distortion; slight movement of facial muscles on the right side, when they are pricked with a pointed instrument. The bowels are said not to have been opened since the attack, a period of ten days. No injury of scalp or cranium can be detected. ℞ *Olii crotonis gut.* ij; *Extr. colocynth. comp. q. s. ft. pil. to be taken immediately. A large synapism to be applied to each leg. Head to be shaved, and a blister applied to the occiput.*

Progress of the Case.—*January 11th.*—Continues in the same condition. Bowels not open. *To have a pill, with ol. crotonis gut.* iv. *A piece of lint 3 inches square to be dipped in strong aqua ammoniæ, and applied to the vertex. January 12th.*—No improvement, though the bowels have been opened once copiously. Breathing is more rapid, with tracheal rale. Surface cold, and covered with a clammy sweat; pulse almost imperceptible. Died in the evening.

Sectio Cadaveris.—Twenty-three hours after death.

Considerable livor, with œdema of hands and feet. Integuments loaded with fat.

Head.—On reflecting the scalp no wound or contusion was anywhere visible. Membranes of the brain healthy. On slicing the brain from above downwards, a slight prominence was observed over the right lateral ventricle, and the cerebral substance forming its roof was softened, and of a reddish brown colour. On opening the right lateral ventricle, its posterior half was seen to be occupied by a clot of blood, which also infiltrated the surrounding cerebral substance to the depth of several lines, which beyond the infiltrated portion was also softened to the extent of half an inch, the dark red gradually passing through fawn-coloured into white softening. The left ventricle was slightly distended with serum. The foramen of Monro enlarged so as to admit a goose quill. Cerebral arteries studded with patches of atheroma.

Thorax.—Heart slightly hypertrophied, otherwise healthy. Aorta healthy. Both lungs much congested, and the bronchi filled in many places with muco-purulent matter. The lower half of the inferior lobe on the right side hepatized. On section it presents a dusky red colour, containing here and there circumscribed purulent-looking deposits about the size of a millet seed.

Abdomen.—Liver slightly enlarged, its right lobe adherent to the diaphragm by chronic adhesions. Gall bladder greatly distended; colon loaded with indurated fœces. Other viscera healthy.

MICROSCOPIC EXAMINATION.—The white softening of the brain surrounding the clot externally consisted of the mechanical breaking up of the nerve tubes as figured, Fig. 363. The fawn-coloured and reddish portions of the softening contained numerous granule cells, mixed with broken down clots of blood, some of which were of a bright orange colour, mingled with numerous crystals of hematoidine. (Fig. 308).

Commentary.—This case was very like the last, chronic arteritis, followed by extensive hemorrhage into one of the ventricles, induced by walking about the streets, and the excitement of drinking whisky. Pneumonia of one lung was also induced. She rallied somewhat from the attack, but again relapsed into coma, which is a very unfavourable sign. The importance of administering a purgative was here well demonstrated, the paralysis having affected the bowels, and caused constipation for ten days, which was with the greatest difficulty even imperfectly overcome. After death the colon was found loaded with indurated fœces.

CASE XXIV.*—*Apoplexy—Hemorrhage at the base of the Brain in a boy aged* 14 *years.*

HISTORY.—Thomas Pitbladdo, æt. 14, a house-painter's apprentice—admitted on the evening of June 6, 1855. His father states that he has generally been a healthy lad, but occasionally complained of pain in his head. This morning he got up as usual and went to his work. He ate his breakfast and dinner at the usual times, not so heartily, it is said, as he was accustomed to do, but he made no complaint. Between 2 and 5 o'clock P.M., he was in the streets carrying errands for his master, during which he purchased and ate several partially decayed oranges. On returning to the workshop he was noticed by the workmen "nearly to fall" from giddiness, and to vomit several times, bringing up the oranges he had eaten. At half-past 7 P.M. his father was sent for, and found him complaining of pain in the head and abdomen. Subsequently he was observed to grind his teeth. An emetic of ipecacuanha was obtained from a neighbouring druggist, which operated once, slightly. He was brought to the Infirmary at 10 P.M.

SYMPTOMS ON ADMISSION.—On admission he complained of pain in the abdomen, on which he pressed his hands. Coma was apparently coming on. Pupils dilated. No strabismus. Pulse natural.

PROGRESS OF THE CASE.—On being conveyed to bed, an attempt was made to pass the stomach-pump, under the impression that the case was one of poisoning. This, however, failed in consequence of the firm spasmodic contraction of the jaws, accompanied by grinding of the teeth. Warm fomentations also were applied to the abdomen. He never became completely comatose, and it was observed that there was strabismus inwards of the left eye with contracted pupil, the right one being fixed with dilated pupil. He lay motionless, with the exception of slight clonic spasms of the left hand and forearm. A purgative enema was given, which returned unchanged. He was then placed in a warm bath. The spasmodic contraction of the jaws however continued, the respirations gradually became more laborious, and he expired about 1 A.M. on the 7th, without having had any convulsion.

Sectio Cadaveris.—Twelve hours after death.

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* Reported by Dr. Wilson Fox, Resident Physician.

Considerable rigor mortis. Sugillation strongly marked; jugular veins turgid with fluid blood. The blood in the heart and all the vessels fluid.

HEAD.—No marked congestion of the scalp. On raising the dura mater, both surfaces of the arachnoid were observed to be unusually dry. Substance of hemispheres healthy. The lateral ventricles contained about ℥ij of sanguineous serum. At the base of the brain was a clot of blood, forming a round tumour the size of a walnut, situated below the arachnoid, and breaking up the cerebral substance surrounding the fifth and third ventricles, and the inferior portion of the optic thalami, between the pillars of the fornix, thereby communicating inferiorly with the lateral ventricles. The sanguineous mass was about an inch in depth. Arteries everywhere healthy.

THORAX AND ABDOMEN.—Thoracic and abdominal organs healthy, with the exception of an ecchymotic circular patch of a brick-red colour, four inches in circumference in the mucous membrane lining the great curvature of the stomach.

MICROSCOPIC EXAMINATION.—The clot composed of recently coagulated blood. The surrounding softened cerebral substance exhibited the nerve-tubes broken up to a remarkable degree, and presenting numerous rounded bodies, with double outlines either isolated or attached to the tubes. The varicosities of the tubes also could readily be increased by pressure. (See Fig. 363, which was drawn from a demonstration of the softening in this case.)

Commentary.—Cerebral hemorrhage is a rare idiopathic lesion in very young persons, and the causes leading to its occurrence in this case are inexplicable. There was no heart disease, nor could coagula be found in any of the vessels. On receiving the patient at night, the house physician, as stated in the report, was led to suppose that the boy had eaten some poisonous substance, and the treatment was founded on this supposition. Pathologically, it is interesting to observe how the same lesion, which in an elderly person would have occasioned coma and paralysis, in the boy caused grinding of the teeth, trismus, and spasms. Coma subsequently came on, probably from the accumulation of serum in the ventricles.

CASE XXV.*—*Apoplexy, followed by delirium, and proving fatal in eight hours—Hemorrhage into the meninges of the brain.*

HISTORY.—Elizabeth Vicars, æt. 59, brought by the Police to the waiting room of the Infirmary, at 2.30 A.M., May 30, 1857. Three and a half hours before admission patient was seated in her own house (Canongate) by the fireside undressing. She is reported up to that date quite healthy, although of intemperate habits, and given to quarrelling with her daughter. She was not subject to giddiness; never attacked by fits nor by palsy. Suddenly at 11 P.M., 29th May, she was observed to fall off the seat, not striking her head against anything. She remained insensible for 10 minutes, and on emerging from unconsciousness, rolled on the floor and shouted—"Murder—Police—I'm mad," etc., and could not be kept quiet.

SYMPTOMS ON ADMISSION.—When seen in No. X. she was lying quiet on her left side, as laid down by the Police; heart's sounds normal. Respiration not stertorous, but natural; pulse 80, of ordinary strength; legs rather cold; body warm. The pupils were equal, rather contracted than dilated; lips not blanched, face naturally pale; the eyelids had been closed. On their being opened, patient began to show restlessness, and this increased when her lower garments were being removed. She shouted and moved from side to side, putting her legs out of bed, and moving both arms freely.

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* Reported by Dr. John Glen, Resident Physician.

The mattress was laid on the floor. Warm bottles were applied to the feet, and cold to the head. Rest and perfect quietude enjoined. She was seen again about 3 A.M., by the House-Physician (Dr. Glen); at that time she was lying quiet. She is reported to have had a spontaneous recurrence of the restlessness, and tendency to vociferate, again sinking into apparent repose. At 7 A.M. she was recognised by the nurse to be dead.

Sectio Cadaveris.—Fifty-five hours after death.

Body well formed, somewhat emaciated.

HEAD.—On removing the dura mater, a hemorrhagic extravasation was found to have occurred below the arachnoid. It covered nearly the whole of the surface of the hemispheres, and formed a thin layer, thickest towards the lateral external surface on both sides. The extravasation was still more abundant over the base, where it was half an inch thick; it extended from a little anterior to the optic commissure to the commencement of the spinal cord; it was particularly abundant around the medulla oblongata. The blood was of a dark colour and very loosely coagulated. The fourth ventricle contained a clot of similar character. There was a cavity filled with blood in the anterior portion of the right hemisphere, communicating with the extravasation into the meninges. It was of the size of a chestnut, but did not extend back into the lateral ventricle—the parts contained in which were quite normal. The arteries at the base of the brain were atheromatous; numerous opaque yellowish patches being found on nearly all the branches. No ruptured vessel, however, could be made out.

THORAX.—Heart weighed 11½ oz.; the left ventricle being slightly enlarged; appeared paler and browner than usual, being found on microscopic examination to be in an advanced state of fatty degeneration. The valves were healthy. On the anterior flap of the mitral valve, and on the endocardium below the origin of the aorta, there occurred several opaque atheromatous patches. The surface of the aorta, chiefly in the ascending portion, but also down to the bifurcation of the abdominal aorta, was irregular from hypertrophy of the lining membrane, with atheromatous and slight calcareous degenerations. Various of the branches were similarly affected, but to a less degree. There were a few old adhesions of the pleuræ, and slight emphysema anteriorly of both lungs.

ABDOMEN.—Abdominal organs healthy.

MICROSCOPIC EXAMINATION.—The coagula of blood presented nothing unusual, and the brain surrounding the extravasation in the anterior lobe of the right hemisphere was only mechanically broken up. The atheromatous patches in the cerebral arteries exhibited the usual structure of that lesion.

Commentary.—In this, as in preceding cases, chronic arteritis had led to hemorrhage, which, however, was for the most part poured into the subarachnoid cavity. The symptoms in consequence presented a remarkable modification, for after the first apoplectic phenomena had disappeared, she exhibited no paralysis, but great restlessness, and delirium with vociferation. These are exactly the effects which result from any acute disorder of the meninges, and indicate how all lesions, by affecting the same parts of the nervous mass, produce similar symptoms. (See p. 126.)

Case XXVI.*—*Hemorrhage into the Right Crus Cerebri—Meningitis at the base of the Encephalon—Serous Effusion into the Lateral Ventricles Chronic Phthisis—Vertigo—Paralysis—Spasms of the Jaw—Delirium and Coma.*

History.—George Crichton, æt. 28, brewer—admitted Jan. 31, 1851. For the last six months he has suffered from a short dry cough, and has sweated profusely at night. His appetite has been good, and he considered himself in good health. Three weeks ago he felt pain in his head, which gradually increased in intensity, although he continued at his work. On the 26th, feeling the headache very severe, he applied eight leeches, but without relief. On the following day as he was going to his work, he had a severe fit of coughing, and expectorated a teaspoonful of florid blood. Immediately after he felt giddy and stupid, being obliged to support himself against a wall. He says he never lost his recollection, recovered himself in a few minutes, and walked home, but with difficulty; afterwards he felt weak, but had perfect command over all his muscles. On Tuesday evening he felt drowsy, and on awakening from one of his short sleeps, he discovered that the power of moving the left arm was much diminished. The left leg was unaffected.

Symptoms on Admission.—On admission, appears weak and emaciated; complains of pain in the forehead; most severe on the right side; has no pain elsewhere. His intelligence seems but little affected. He speaks slowly, reluctantly, and with an effort. The special senses are unimpaired. The power of motion in his left arm and leg is almost entirely gone. He can neither stretch nor flex his arm or leg. His leg has become much more useless within the last twenty-four hours. Sensibility of the parts is unimpaired, and he feels impressions made upon them. His mouth is very slightly twisted to the right side; tongue protruded straight. During the examination before the class, he was seized with spasmodic movements of the lower jaw, lasting for a minute and a-half, unattended with pain. This was first observed on Wednesday,—when it occurred nine times,—and has returned at irregular periods since. Pulse 60, not increased in strength. Cardiac sounds normal. Appetite good. Tongue clean in centre; covered with a white fur at edges. Bowels generally costive; not opened by medicine last night. Urine 1027 sp. gr.—deposits a copious sediment of mucus and phosphates. Has occasional slight cough; there is dulness on percussion under left clavicle, with harsh inspiration, and great increase of vocal resonance. He was ordered ice to the head; quietness to be maintained.

Progress of the Case.—*Feb.* 2.—To-day headache is abated, he complains of weakness in the right eye, which he cannot keep open without an effort. On frowning, the corrugations are more distinct over the left eye. The right pupil is less contracted than the left. *Feb.* 3.—Slept ill last night, had a good deal of convulsive twitching of the unaffected side. Is more confused. Tongue has a dense white fur over it. Bowels costive. ℞ *Olei Ricini* ℥iss, to be followed by laxative enema, if required. *Feb.* 4.—Bowels moved after administration of the injection. Has had a good deal of muttering delirium,—passes his urine in bed. Appears to know he is addressed, if spoken to in a loud voice, but gives no answer. Pulse 60. Small and weak. Twitchings more distinct and decided. Breathing not laboured. ℞ *Carb. Ammon. gr.* xij; *Mist. Camph.* ℥vj; *M. Signa, two table spoonfuls every third hour; App. Vesicat.* 3 + 4 *ad Nucham.—Cold to head. Feb.* 5.—Muttering delirium last night; does not seem to feel a prick on his left leg; is restless when spoken to, but never speaks. Pulse 60, still small, but stronger than yesterday; has some dysphagia. *Feb.* 6.—Quiet during the night; had a slight attack of general convulsions; bowels opened by enema. Pulse 75, of good strength. *Feb.* 7.—Was more restless during the night; picking the bedclothes; no muttering; respiration is more hurried and laboured; there is puffing of the left cheek during expiration; left pupil more contracted than right; jactitation of the right arm. *Feb.* 8.—Dysphagia is increasing. Pulse 80. Twelve leeches were applied to the temples. To have one drop of croton oil every four hours. *Feb.* 9.—Breathing more hurried and laboured. Pulse 116, small and weak. Bowels freely opened by the croton oil. Appeared to feel the bites of the leeches. This morning he had a return of the general convulsions, more severe, and lasting for a longer period than the former, accompanied with frothing at the mouth. *Feb.* 10.—Last night, about 8 P.M., he began to moan and cry out, but no convulsions. The respiration became more laboured, and accompanied by a tracheal râle. At 12 P.M., he died comatose.

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* Reported by Mr. Cuningham, Clinical Clerk.

Sectio Cadaveris.—Thirty-six hours after death.

HEAD.—On removing the calvarium, the sinuses of the dura mater were found almost empty; the longitudinal one contained a small decolorised coagulum. The cerebral arachnoid was very dry, the surfaces of the hemispheres flattened, and the convolutions pressed together. The ventricles were distended by 13 drachms of colourless limpid serum, and freely communicated with each other by means of the foramen of Monro, which was much enlarged. The fornix, septum lucidum, floor of the fourth ventricle, and corpus callosum, were of pultaceous consistence, and readily broke down under the fingers. On removing the brain, a semi-opaque exudation of yellowish-white colour was seen in the subarachnoid space at the base of the brain, extending to the sylvian fissures laterally, surrounding the chiasm of the optic nerves anteriorly, and stretching as far back as the fifth pair posteriorly. Here, however, the coagulated exudation was very thin and soft, whereas immediately behind the optic commissure, it was one-eighth of an inch thick, and of considerable density. On slicing the optic thalamus from above downwards on the right side, there was discovered below that ganglion, in the crus cerebri, a clot of dark-red blood the size of a pea, surrounded by several smaller red spots, the result of capillary hemorrhage. The cerebral substance surrounding it was softened to the extent of a quarter of an inch all around. In the pons varolii, two masses, the largest the size of a millet seed, of yellowish indurated chronic exudation, were discovered.

CHEST.—Pleuræ of both lungs were adherent at the apex, especially on the left side. The lining membrane of the bronchi appeared congested, and of a reddish colour. The bronchial glands were loaded with pigment. A cavity was broken into, when separating the dense adhesion at apex of left lung, and a dirty greyish-white, tolerably tenacious, fluid escaped. This cavity was capable of holding a hen's egg. Walls were irregular, and lined by no distinct membrane. The surrounding texture was of a deep red colour, and displayed on section numerous yellowish hard miliary tubercles. These were also found scattered over the lower part of the left lung. The right lung was crepitant throughout, and displayed here and there on section the same bodies as above described.

ABDOMEN.—Numerous yellowish miliary tubercles were found in the cortical and tubular portions of both kidneys. Other viscera healthy.

MICROSCOPIC EXAMINATION.—The exudation at the base of the brain was composed of bands of molecular fibres, mingled with curled and spiral elastic filaments. In the softer parts of the exudation, the delicate molecular fibres at irregular intervals contained nuclei, most of which were oval, and a few fusiform. The centre of the clot in the crus cerebri was composed of numerous blood corpuscles, and the surrounding softened cerebral substance contained numerous granules and granular cells. The serum in the ventricles was structureless, and the cerebral softening of the white substance contained no granule cells, the normal structure being only more easily separated and capable of being broken up when crushed between glasses.

Commentary.—This is an instructive characteristic case of that form of apoplexy which has been called *ingravescent*, commencing with headache, followed by temporary loss of consciousness and voluntary motion, then recovery, and, after a period varying from a few hours to several days, gradual return of the coma, almost always followed by death. Such return of coma is usually the result of gradually increasing pressure on the brain, but the pathological cause of that pressure is not always easy to determine. Most commonly it is the result of a hemorrhage slowly increasing, and at length forming a large coagulum. Occasionally it is caused by an effusion of serum into the ventricles, and a few cases have been observed where it was the effect of a congestion which either might or might not leave traces after death. In the present case we found four lesions of the nervous structure,—1st, Chronic exudation at the base of the brain; 2d, A hemorrhagic clot in the right crus cerebri; 3d, Accumulation of serum in the lateral ventricles; 4th, Softening of the central structures of the brain. Of these lesions the three first doubtless united in producing the symptoms, whilst the last was post-mortem, dependent on imbibition of the serum after death. Here it is important to observe, that the exudation of the base was chronic, for in structure it was firm and fibrous, characters which I have never seen in recent exudations into the subarachnoid cavity, which are generally purulent. It is exceedingly probable, therefore, that the headache and premonitory symptoms were occasioned by the meningitis; whilst the subsequent twitchings and convulsions were attributable to the presence of the exudation, more especially the pressure and irritation occasioned at the base of the encephalon by the subsequent changes, through which it passed. Then the apoplectic attack on the 27th was entirely owing to the hemorrhage into the right crus cerebri. This hemorrhage was small in amount, and the apoplectic condition was momentary. It probably, however, increased somewhat afterwards, and broke up the nervous structure of the crus; and the result was interruption of the conducting power between the brain and left side of the body,—in other words, hemiplegia. Lastly, the exudation and clot combined must have exercised pressure on the veins, producing dropsy of, or effusion into, the lateral ventricles, whereby was produced a gradually augmenting pressure on the whole organ, occasioning the ingravescent coma. It may be a question how far the spasms of the jaw were occasioned by the clot in the crus cerebri irritating the deep origin of the motor branch of the fifth, or by the exudation surrounding its superficial origin from the pons varolii.

I am inclined to think the first theory the true one, because both divisions of the fifth were alike surrounded by the exudation at the base, and yet spasm only was caused, and no pain.

The treatment of this case was very carefully considered, the more so as it was the evident opinion of the examining class, and of the clerks, that it should be treated actively by blood-letting. The student and young practitioner is generally an advocate for active treatment; and this was certainly a case in which a difference of opinion might be expected to exist even among the most experienced. The circumstances, however, which forbade general bleeding, were, the condition of his pulse, which, though of good strength, was never full or hard; the paleness of his countenance, and his general habit of body, which was far from robust. The existence of phthisis did not influence me at the time; but I think it supports the correctness of the conclusion I arrived at. Many years ago when studying the subject, nothing struck me more in carefully analysing the cases of Abercrombie, in reference to this question, than the fact, that notwithstanding he waited until the circulation rallied, and the pulse rose, the almost constant statement is, that a full blood-letting produced "no benefit," "no relief," "not the smallest benefit," and so on. And in such cases, when pressure is caused by a solid coagulum or local obstruction to some part of the venous system, inducing effusion, how can bleeding lessen the pressure *when the heart's action is not increased?* We have already seen that the idea of diminishing the amount of fluids within the cranium by bleeding is visionary, and experience fully proves its uselessness, even in the hands of men who inculcate the practice. All agree, however, that you can only relieve pressure on the brain by influencing the force of the heart's contractions. But in the present case, so far were these contractions from being increased, that they were normal when he was first admitted, and exhibited a tendency to diminish in force. Indeed so low was the pulse on 4th February, that I administered stimulants, *under which he rallied.* Looking, then, retrospectively at this case, it appears to me certain that bleeding, by diminishing the force of the general circulation, would have increased the tendency to effusion in the lateral ventricles, and would have hastened rather than retarded the fatal result.

CASE XXVII.*—*Apoplexy—Hemorrhage into right Optic Thalamus, causing Hemiplegia on left side—Progressive Recovery—Two months afterwards, Hemorrhage into Pons Varolii and Membranes on right side—Death in seven hours.*

HISTORY.—Margaret Lockie, æt. 57, a sempstress—admitted on the evening of December 8, 1854. A friend who accompanied her, said that the patient had been very much addicted to drinking, and had an attack of delirium tremens a month ago, for which she was treated in the Infirmary, and dismissed cured after a week's treatment. She continued well until three days ago, when, sitting in a neighbour's house, she suddenly fell from her chair insensible. This occurred about five o'clock P.M., without any obvious cause, as at the time she was pursuing her usual employment of sewing.

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* Reported by Mr. Almeric Seymour, Clinical Clerk.

Symptoms on Admission.—On admission the face presents its natural appearance and is in no way distorted. The intelligence is much impaired, although she is so far conscious, that when loudly spoken to, she mutters something, and with great effort can articulate indistinctly "Yes," and "No." The eyes are suffused and red; the pupils normal; the right hand and arm are paralysed, though the sensibility is not absolutely gone. Sensibility also is greatly diminished, and motion completely lost in the right inferior extremity. The left leg is abruptly retracted on pinching it; the left arm and hand unaffected. There has been no convulsion, nor is there any muscular rigidity. She cannot protrude the tongue. State of digestive system cannot be ascertained. Heart sounds normal in character, but weak. Pulse at the wrist 60, barely perceptible. *One drop of croton oil to be administered in the form of bolus immediately. A sinapism to be applied to the back of the neck. ℥ss of sherry wine to be taken every two hours.*

Progress of the Case.—*December 9th.*—Is more conscious. Urine loaded with lithates, otherwise healthy. Bowels have not been relieved. *December 10th.*—Has had a dose of castor oil, and the bowels have been freely relieved twice. Is now so far conscious that she attempts to speak voluntarily, and she can mutter various words. On smiling, it is distinctly seen that the mouth is dragged to the left side, and that the right half of the face is paralysed. She can now also protrude the tongue, which is very foul. Skin of natural temperature. Pulse 68, still weak, but of better strength. Has taken nourishment. To have ℥iij of sherry daily. From this time she rapidly recovered her consciousness. On the 20th she could readily answer questions, and the mind seemed perfect, but the articulation is still difficult. On the 31st articulation is nearly distinct. *January 14th.*—Paralysed parts still immovable, but their sensibility has to a great extent been restored. *January 25th.*—Galvanic currents to be applied to the right leg and arm. *February 1st.*—Can now move the right arm voluntarily to a certain extent. Right leg still immovable. Paralysis of jaw has disappeared. *February 12th.*—Has been doing well up to four o'clock this morning, when after having been assisted out of bed, she suddenly began to moan, and was seen by the nurse to apply her left hand to the head. She was seen by the house physician (Dr. M'Laren) ten minutes afterwards, and was found to be quite unconscious, breathing heavily. The left pupil dilated, the right contracted, and both were insensible to light. All the limbs were powerless, and fell on being raised like inert masses. The respirations rapidly became more laborious and less frequent, and she died at eleven o'clock.

Sectio Cadaveris.—Fifty hours after death.

Head.—On removing the calvarium and dura mater, the surface of the arachnoid was observed to be unusually dry. In the right temporal region was a thin extravasation of blood, in the subarachnoid cellular tissue. The lateral ventricles contained above ℥ij of sanguinolent serum, and communicated freely with each other by means of the foramen of Monro, which was the size of a goose's quill. The right corpus striatum and optic thalamus were healthy, but the left optic thalamus was disorganised throughout, its centre being occupied by a clot of blood the size of a hazel nut, dark in the centre, of a brick red colour externally, surrounded by softened cerebral matter of a yellow fawn colour. On removing the brain, the extravasation formerly noticed on the right side was seen to extend downwards over the base of the brain on the right side, and over a portion of each lobe of the cerebellum, forming a thin layer of blood between the pia mater and arachnoid membranes. The arteries at the base of the brain presented numerous opaque patches of atheroma. On cutting into the pons, an extravasation of blood had taken place into its substance, disintegrating the whole of it; it was of a dark red colour, evidently recently poured out, and was fluid in some places, and loosely coagulated in others.

Chest.—With the exception of a few atheromatous patches on the aorta and mitral valve, which latter in no way impeded efficiency, the thoracic organs were healthy.

Abdomen.—Abdominal organs also healthy.

Microscopic Examination.—The softening of left optic thalamus consisted of disintegration of the tubes; fatty granules accumulated in the ganglionic cells; numerous granule cells, several tinted of an orange colour, and others of a dusky red, in the immediate neighbourhood of this clot, mingled with several crystals of hematoidine, and masses of blood varying in tint. The centre of the clots presented a series of laminæ of a brownish black colour. The broken up pons varolii infiltrated with blood corpuscles, and the tubes more or less disintegrated.

Commentary.—In this case circumscribed hemorrhage into the right optic thalamus caused apoplexy and hemiplegia on the left side, from which she was gradually recovering, when an unusual exertion caused a secondary fatal hemorrhage into the pons varolii. Here the primary disease was chronic arteritis, causing brittleness of the vessels. In all such cases too much care cannot be taken to avoid sudden exertion, agitation of mind, and every other circumstance which is likely to produce increased pressure on the blood-vessels.

Case XXVIII.*—*Five years before admission Hemiplegia—Recovery—Four months before admission Apoplexy, with convulsions—Partial Recovery—Pulmonary Disease—Death by Asphyxia—Chronic Softening of Right Corpus Striatum—More recent Hemorrhage into the Pons Varolii—Cardiac Hypertrophy, with mitral constriction—Hemorrhage into the Lungs.*

History.—Mrs. Macpherson, æt. 34, admitted December 22, 1850—of intemperate habits. She has been troubled for the last four years more or less with cough. Five years ago she had an attack of paralysis affecting the left side of whole body. Her speech was thick. The left cheek appeared more prominent than natural; there were twitchings also of the left arm. Leg not affected. Intellect unimpaired. She recovered perfectly in two or three months. She continued, however, her intemperate habits, and was addicted to taking laudanum. Four months ago, after taking a drachm of laudanum, she was suddenly seized with violent convulsions, sprang a little distance, and fell on her face. She was quite unconscious at the time, a condition from which she gradually emerged, but her mind has ever since been affected, and the power over the left side is much impaired. Since the second attack, she has been subject to violent and sudden fits of coughing, lasting for hours without intermission, which have latterly increased.

Symptoms on Admission.—On admission, she leans to the right side when sitting. Countenance anxious, motions of chest rapid, with much elevation of thorax during inspiration. Dyspnœa urgent. Cough constant and paroxysmal. Expectoration copious. On percussion, the anterior surface of the chest sounds resonant. There is dulness over the infra-scapular region of left side. On auscultation, the inspiration is short, and the expiration much prolonged, and accompanied with sibilant and sonorous rales over the whole anterior surface of both sides; loud crepitating and mucous rales over the inferior portion of left back, with distinct crepitation also inferiorly in right back. Vocal resonance is increased over left infra-clavicular region. Heart's sounds normal, distant. Tongue of a brown colour, moist. Appetite bad. Bowels regular. Catamenia regular. Has no pain in head or any part of her body. Skin hot and moist.

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* Reported by Mr. Pearse, Clinical Clerk.

PROGRESS OF THE CASE.—*December 30th.*—She has been treated with various anodyne expectorant mixtures, sulphuric and nitric ether, ipecacuan wine, chloroform, morphia, etc., to relieve the cough and difficulty of breathing, but with little benefit. Is weaker to-day. Countenance sunk and anxious. Tossing about of arms. Breathing short and rapid. Cough almost ceased. Expectoration greatly diminished. Pulse weak, scarcely perceptible. *Ordered spirit. communis,* ℥ij; *porter* 1 *pint. January* 1*st.*—Exhaustion still greater. With difficulty roused to answer questions; incoherent in her conversation; sleeps little; breathing rapid, short, and laboured; paroxysmal cough. The rales formerly noticed still continue; dulness over the left back more extensive and complete. Pulse small. *Spirit. commun.* ℥iv. *January* 2*d.*—Since yesterday there have been coldness and lividity of face, with stupor gradually increasing. Dyspnœa very urgent. Expectoration scanty. These symptoms increasing, she died at 3 A.M., January 3d.

Sectio Cadaveris.—Nine hours after death.

HEAD.—The dura mater and arachnoid membrane were healthy in structure, but the subarachnoid cavity contained superiorly a small quantity of serum between the sulci. Both lateral ventricles contained about a drachm of fluid, but that on the right side was opaque, of a greyish colour like dirty milk, while that on the left side was colourless and clear. Three-fourths of the right corpus striatum posteriorly was reduced to a fawn-coloured diffluent pulp, from which a turbid grey fluid flowed out on puncture, similar to what had tinged the serum in the ventricle. The white substance external to the corpus striatum was not affected, the lesion being limited to a space about the size of an almond nut. On cutting through the softened texture, a few bright yellow patches were observable, about the size of a millet seed, closely resembling in appearance the reticulum often seen in soft cancer. On slicing the pons varolii, there was observed near its centre, a little to the right of the median line, a hemorrhagic extravasation the size of a small pea, the centre of a dark red, and the circumference passing into a rusty brown. Other portions of the encephalon were healthy.

CHEST.—The left ventricle of the heart was somewhat hypertrophied, the apex rounded, the mitral orifice was smaller than usual—just admitting the thumb—but there was no thickening or disease of the lining membrane. Lining membrane of the heart and large vessels stained of a claret colour—blood fluid. Both lungs anteriorly emphysematous. The lining membrane of the bronchi of dark mahogany colour, and more or less filled with sanguinolent mucus. Inferior lobe of left lung greatly engorged, containing coagulated masses of extravasated blood, varying in size from a pea to a moderate-sized orange. Inferior lobe of right lung also engorged, with similar masses of blood, but not so numerous or so large as on the opposite side.

Abdominal organs healthy.

MICROSCOPIC EXAMINATION.—The turbid fluid in the right ventricle of the brain contained numerous floating compound granular cells and masses. The softened portion of the corpus striatum was infiltrated with them throughout, and the bright yellow masses were composed of an aggregation of the same cells and masses mingled with innumerable molecules and granules. The clot in the pons varolii contained several round and oval cells, varying in size from the four to the six hundredth of an inch in diameter, crowded with blood corpuscles. No compound granular cells were anywhere visible in its neighbourhood.

Commentary.—The history of what occurred to this woman previous to her admission, involving the account of the two paralytic seizures, was obtained after her death from the husband, who attended the post-mortem examination. During the period she was under treatment, the pulmonary symptoms were those that excited chief attention. The weakness stated to exist on the left side of the body was certainly very slight, as, in the frequent examinations which occurred, it was observed that she sat up when desired to do so, presented either hand when bid to have the pulse felt, and frequently got out of bed without assistance. The crepitating and mucous rales, with the dulness of percussion and great prostration of the patient, however, left little hopes from the first of her recovery; and of these symptoms she alone complained, never speaking of a former or a present palsy. These facts in themselves are very curious, when compared with those narrated when the brain was examined, although here it must be confessed that the investigation of the nervous phenomena, from the dislike of closely interrogating a woman evidently dying, was not very minute. There can be little doubt that the first attack was owing to disease (perhaps a hemorrhage into the right corpus striatum) five years previously, and the second, four months before admission, to the limited hemorrhage into the pons varolii.

The predisposing cause of cerebral hemorrhage is, in the vast majority of cases, previous disease and consequent brittleness of the arteries. It is true there are some rare instances in which it cannot be traced to this circumstance, and where its origin is obscure (Case XXIV.), or where in young persons, or those of middle age, it may originate from obstruction of the vessels by clots sent from a distance, as previously explained. Still even in these, and in the great majority of individuals advanced in life, among whom apoplexy and sudden palsy are common, chronic cerebral arteritis may be considered as the real disease, and hemorrhage as its result. Hence why all those circumstances which induce increased pressure on the internal surface of the arteries are the proximate causes of apoplexy and sudden palsy, such as violent exertion, constipation, straining at stool, strong drinks, undue repletion at meals, mental emotions, etc. etc.

The histological facts ascertained in connection with the hemorrhagic clot are important. The coloured blood corpuscles at first accumulate in groups, and some of them are subsequently surrounded by a celloid membrane. Under such circumstances they slowly disintegrate; the red colour is changed into a brown, which becomes darker and darker, and is ultimately converted into black. Not unfrequently crystals, supposed to be of hematine, are scattered among the broken up clots, and have been seen both of a deep-red and black colour even within the membrane alluded to. That this membrane really does form in the manner described—that is, secondarily—around heaps of blood corpuscles, I am satisfied, my former assistant, Dr. Sanderson, having proved it by direct experiments in my presence. He thrust a needle through the cranium into the cerebral lobes of four pigeons which were killed, and the brain inspected, successively on the third, fifth, and sixth days. There could be observed in one case, where a slight hemorrhagic streak marked the track of the pin, that the cerebral substance, seen under a magnifying power of 250 diameters linear, contained groups of from five to twelve oval blood corpuscles, each surrounded by a delicate membrane. (See Fig. 276, p. 221). When the clot is large, this process may go on through its entire substance, in conjunction with the formation of compound granular cells. I examined a tumour the size of a small hen's egg, brought to me by Dr. Peddie, in which the external layer presented numerous fibre cells and fibres, in various stages of development, whilst the interior was principally composed of numerous granules and compound granular cells. Here and there, however, were patches of red extravasation, more or less recent, containing large delicate vesicles filled with blood globules. (See Fig. 275, p. 221). In another tumour sent to me for examination by Dr. Kirkwood of Berwick,* which was the size of a large orange, and imbedded in the right cerebral hemisphere, I found it to consist of a firm resistent shell or capsule, about one-eighth of an inch thick, containing coagula of blood of a brick-dust colour. The capsule, externally, was of a straw colour, like that of coagulable lymph; but one-third of its thickness,

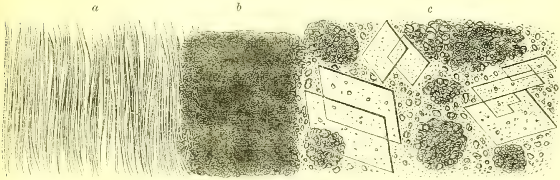

Fig. 369.

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* Monthly Journal. March, 1851.

Fig. 369. Section of the capsule and portion of the coagulum, size of an orange, found in the brain in Dr. Kirkwood's case. *a*, External portion of capsule consisting of fibrinous laminæ; *b*, internal portion of capsule, rendered dark-red, purple, and opaque, from condensed blood corpuscles; *c*, broken-down blood corpuscles in the interior, with crystals of cholesterine. 250 *diam.*

internally, was dark red, passing into black. A small portion of the external layer of the capsule, examined under a power of 250 diameters linear, presented apparently a dense mesh-work of fibres, running in waved bundles, which in fact were the edges of laminæ. The thicker internal layer was composed of similar fibres, mingled with masses of blood corpuscles, in various stages of disintegration. The internal coagula were composed of numerous molecules and granules, and a mass of blood corpuscles, diminished in size, and variously altered in shape, but still presenting their normal yellow hue, mingled with numerous crystals of cholesterine. These and numerous other examinations have convinced me that, when the hemorrhagic extravasation is small, it breaks down and disintegrates in a period varying from three to six months. Even then it may leave traces of its existence, especially in the form of a cyst, the internal membrane of which is of a bright orange, or brick-red colour. On examining this membrane, or the coloured softening in its immediate neighbourhood, it may be seen to consist of numerous molecules and granules, sometimes associated with fragments of the nerve-tubes. There are also granular corpuscles and masses, variously tinted, of a bright orange, brick-red, reddish-brown, or dark brown. The former are evidently the celloid bodies formerly described and figured (Fig. 275), containing blood corpuscles in different stages of disintegration. There are also frequently present a greater or less number of crystals of hematoidine, of a deep red or ruby tint. (Fig. 369.) If the clot be large, the period required for absorption may extend to years, and then the external portions of the clot are transformed into an external fibrous cyst, within which the blood is very slowly disintegrated and absorbed. Most commonly, however, in these cases, long before absorption occurs, secondary changes take place in the surrounding nervous structure, or pressure is exercised on parts at the base of the cranium, whereby convulsions, paralysis, or other symptoms occur, and life is destroyed.

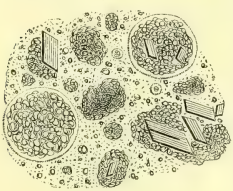
Fig. 370.

The diagnosis of cerebral hemorrhage from the other lesions of the brain is not always easy, in consequence of the fact that a chronic cerebritis may come on imperceptibly and then induce apoplexy or sudden palsy. It may generally be observed, however, that a true exudative cerebral softening is preceded by more or less weakness of the intellect, and more especially by slowness in receiving mental impressions, or framing replies to questions, frequently combined with

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Fig. 370. Granular corpuscles and masses, of a bright orange and pale yellow colour, some of them passing into brown, with crystals of hematoidine from an old apoplectic clot. 250 *diam.*

more or less headache, confusion of ideas, and perversion of motion. Much, however, will depend upon the seat of the lesion, the mind being affected most in proportion to the extent and nearness of the disease to the hemispherical ganglion—and motion, according as the central and basic parts of the brain are affected. It must not be forgotten, however, that whilst a cerebral softening may occasionally lead to or be complicated with a hemorrhage, so a hemorrhage is one of the most common causes of a softening. The distinction between the two under such circumstances becomes very difficult. Still there can be no question that *suddenness of attack*, whether of apoplexy or of palsy, is (excluding external injury) the characteristic symptom of cerebral hemorrhage. Occasionally, however, sudden paralysis makes its appearance in cases of chronic softening, a result which Dr. Todd has attributed to the rupture or deliquescence of tubes which had been already softened, but not sufficiently to interrupt their power as conductors of the nervous force. Whether hemorrhage be consecutive on diseased arteries, or upon their calibres being obstructed by clots, must be determined from all the facts of the case; the former being most likely in elderly, and the latter in younger persons with diseased hearts. Little, however, is as yet understood of this point diagnostically in the living subject. For what is known with regard to the seat of cerebral hemorrhage and softening I must refer to page 125.

The influence of cerebral softening and hemorrhage on the motor function has justly excited the attention of physicians. Whilst by some more or less contraction and rigidity of the limbs have been considered as highly characteristic of inflammatory softening, others have maintained that it is altogether incidental, that it often exists when no softening can be found, and that it is as often absent when softening is present. It has also been known to accompany hemorrhages, apparently unconnected with softening. The analysis of many cases in reference to this subject has led me to the conclusion, that on the whole muscular rigidity or contraction is a valuable sign of softening *when present*, but that as the softening may be permanent, whilst the rigidity is only temporary and indicative of the irritating effects of the lesion, the absence of the one is no proof of the non-existence of the other. It should be remembered that much of this discussion took place formerly when no means were known of distinguishing histologically between inflammatory, hemorrhagic, and post-mortem softenings. Dr. Todd has especially drawn attention to the state of the muscles in palsied limbs from cerebral disease,* arranging the cases into three classes:—1st, Those in which the muscles of the paralytic limbs were completely relaxed; 2d, Those in which the paralysed muscles exhibit rigidity from the moment of, or soon after the attack; 3d, Those in which rigidity comes on long after the paralysis. The first class of cases he considers usually result from hemorrhage, combined with previous softening of the brain and rupture of the tubes, the clot of blood being separated from healthy brain. The second class of cases depends on the clot of blood acting directly on sound brain at the point of implantation of the nerves of the affected muscles; while the third class of cases are owing to a similar irritation from an attempt at cicatrization of the brain's substance. These views of Dr. Todd, though ingenious, must as yet only be regarded as probable speculations. The true generalization appears to me to be, that complete paralysis indicates such pressure on or obstruction of cerebral tissue as to prevent all transmission of nervous influence, whilst rigidity, convulsion, and pain show that some tubes of that tissue are preternaturally excited. Both conditions may be occasioned by hemorrhage, exudation, effusion, tumours, or any lesion that affects the brain.

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* Clinical Lectures on Paralysis, etc. 1854.

The treatment of cerebral hemorrhage must refer to the attack, and to the subsequent management of the case. At the moment of attack, the steps to be pursued must always be a subject of anxious consideration. Formerly there was little difficulty—venesection to a large extent being the established routine remedy. The advance of pathological knowledge, however, must have made it apparent, that the same proceeding is not likely to be beneficial in all cases where the nervous centres are similarly affected. We may have sudden loss of consciousness and volition from syncope, as well as from coma, the only supposed difference between the two being, that the same nervous phenomena commence in the heart, with a weak pulse, in the one case; whilst they originate in the brain, and have a strong pulse, in the other. But careful observation has sufficiently proved that there are many cases of even true hemorrhagic apoplexy which are closely allied to syncope, and which have recovered under the use of stimulants, rather than of depletions. It seems to me also very probable that many of those individuals who died under what Abercrombie called simple apoplexy, and in whom no trace of disease could be found in the brain after death, were really the victims of one form of fatty degeneration of the heart—an affection in his day altogether unknown. The best rule, therefore, I can give you, is to judge from all the circumstances of the case. Whenever the individual is of vigorous frame of body, if the face be flushed, the attack recent, and the pulse strong and full, a moderate bleeding may be beneficial. The extent must be influenced by its effect on the heart's action; for as we have seen, the object of this measure is not to draw blood from the brain, which is impossible, but to diminish the pressure on that organ, by lessening the force with which the heart propels the blood through the carotid and vertebral arteries. On the other hand, if the individual be of spare habit, the face pale, the pulse weak and irregular, and the usual symptoms of shock be present, wine, brandy, stimulants generally, and restoratives are demanded. But it most frequently happens that when you are called in, neither one nor the other indication presents itself. It will be most prudent, under such circumstances, simply to apply cold to the head, administer an active purgative, and above all enjoin quietude. At the same time the patient should be placed in the horizontal position, with the head slightly elevated, whilst the cravat, stays, and all impediments to the respiratory and circulatory functions be removed.

Should the individual recover from the attack, quietude, mentally and bodily, whilst the animal economy is well nourished, constitute the chief indications. Thus, long conversations, literary labour, business transactions, the sudden reception of joyful or distressing intelligence, etc., should be carefully avoided. Sudden exertions, rising from bed (See Case XXVII.), constipation, straining at stool, etc., must be guarded against. Of all these I believe the prevention of constipation to be the most important, as the straining at stool thereby occasioned is one of the most common causes of secondary attacks. If paralysis remain, considerable caution must be exercised before having recourse to local stimulants, such as frictions, galvanism, or exercise of the affected parts. These are remedies of undoubted utility, but never to be employed at the risk of causing general excitement, and always very gradually applied, and their increase regulated. Exactly the same management is required in cases of chronic cerebritis, or where there is reason to suspect that coagula from the heart constitute the cause of the cerebral lesion.

CANCER OF THE BRAIN.

Case XXIX.*—*Cancer of the Brain, Spinal Cord, Liver, and Bones.*

History. — George Gaul, æt. 29, a stoker on board a steam vessel, admitted July 1st, 1857. About the beginning of December 1856, he contracted a cold with cough and profuse expectoration, and has not since enjoyed good health. At the end of March 1857, he began to feel pain in the lumbar and sacral regions, extending also to the neck and affecting the shoulder joints, and spreading down to the joints and muscles of the arms. The knee joints were also painful. They are reported to have been swollen, but only for a short time. At the commencement of last April, he seemed to labour under confusion of thought, with shortness of memory, and incapability of carrying on a train of ideas. Was admitted to Ward IV. on the 29th April, and during the next two months became gradually more weak and emaciated; at length was unable to walk or to rise unassisted; passing his urine in fair quantity, but involuntarily during sleep.

Symptoms on Admission.—Has no headache ; is very silent, but listens to questions, and answers them after a slight pause intelligently. The questions, however, require only monosyllabic answers. He says little, and his thoughts are apparently few. Special senses normal. The pupils are unusually dilated, but contract on stimulus of light ; are equal and parallel. No paralysis of the muscles of the face or tongue. Marked tenderness over dorsal and still more over lumbar vertebræ. Never had tingling or numbness of the extremities. All attempts to walk cause great pain in the back, to such a degree that he cries out. Great atrophy of the muscles; he moves very little; lies often in a cramped position; cannot rise up in bed without assistance. The tongue is clean; the appetite is reported to be good; but he frequently vomits, sometimes immediately after a meal, sometimes an hour or two afterwards. No increase in hepatic or splenic dulness; abdomen appears natural, except in being retracted and emaciated; the bowels are habitually costive. He has at present no cough, sputum, nor dyspnœa. The respiratory murmurs appear healthy; the cardiac sounds are natural. Pulse 82, small and weak. The urine is passed involuntarily during sleep, but is retained during the day. It is of a light straw colour, sp. gr. 1005; no albumen but chlorides are abundant. *Is ordered nutritive food, with laxative pills, and, if necessary, enemata.*

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* Reported by Mr. John R. Murray, Clinical Clerk.

PROGRESS OF THE CASE.—*July 6th.*—Is growing weaker; pulse 96, small and wiry; has a headache, chiefly over the occipital region. *July 9th.*—The pain in his head continuing; *the hair is shaved; cold cloths are applied to the scalp, and a blister is put over the nape of the neck.* *July 10th.*—Pulse 104, very weak; hot skin; great thirst; little appetite, and frequent vomiting usually some time after taking food. *Is ordered a saline mixture, and four ounces of port wine daily.* *July 12th.*—On re-examination, besides the atrophy common to both lower extremities there appears to be almost total want of sensibility and motion in the right leg; the left leg being, for one so emaciated, quite normal. Pupils continue widely dilated; there is no headache at present. *July 14th.*—Is able to move the right leg slightly, and feels irritants applied to the sole of the foot, but not to the limb generally. Again complains of pain diffused over the whole occiput; pulse 112, weak. *July 18th.*—Complains of his vision becoming impaired; can recognise objects, and name their number. Had an evacuation yesterday morning, and for two days has not vomited so much as formerly. Has headache, but it does not seem severe; the application of cold has been continued. *July 19th.*—Pulse 148, small, weak, and hard. Respiration 22 per minute. *Ordered two additional ounces of wine; continue nutrients.* *July 21st.*—Vomiting recurred yesterday, after being nearly absent for a week; is observed to recur when the bowels have been much confined, and to disappear after copious evacuation. *Ordered two pills, and if necessary an injection.* *July 29th.*—Vomited less after operation of the laxatives; is extremely weak, but little change can be noticed from day to day. *July 30th.*—This morning he was found more exhausted; a cold sweat over the whole surface; the respirations short and hurried; the pulse extremely feeble, but cardiac impulse at apex increased. Wine was freely given, but he sank, and finally expired at 2.30 P.M.

Sectio Cadaveris.—Forty-eight hours after death.

Body moderately emaciated.

HEAD.—On removing the dura mater, the surfaces of the hemispheres were unusually smooth, from flattening of the convolutions. The vascularity of the membranes was normal. On slicing the brain it was seen to be studded throughout with nodules varying in size from a hemp seed to that of a large hazel nut. They were of a grey, pinkish colour, the smaller of pulpy consistence, the larger more firm, and all capable of being easily enucleated from the surrounding brain substance. None of them projected from the surface, but they were irregularly distributed, some in the grey, but most in the white matter. Here and there was slight softening round some of the masses, but there was no extravasation of blood. In the right hemisphere, projecting a little through the roof of the ventricle, was a mass the size of an ordinary marble. In the roof of the left ventricle was another of similar dimensions. The left corpus striatum contained two of these bodies, one the size of a small cherry, situated anteriorly; another that of a pea, somewhat more posteriorly. Around these was no softening. The optic thalami were normal. Similar bodies were scattered through the cerebellum, but there were none in the pons varolii and medulla oblongata. Each lateral ventricle contained almost a drachm and a half of clear fluid. On removing any of these bodies, there could readily be squeezed from them a creamy matter, leaving behind an apparently membranous substance evidently very vascular.

Spinal Column.—The four upper dorsal, and two or three of the lower dorsal, and the first lumbar vertebræ, were soft and spongy, the osseous substance yielding on pressure a copious, thick, greyish juice. The membranes of the cord were healthy. On bisecting the cord, a mass the size of a pea, exactly similar to those observed in the brain, was found in its right half, opposite the junction of the second and third dorsal vertebræ.

Chest.—About the centre of the sternum was a slight bulging, of reddish colour and soft consistence, yielding a dirty yellow coloured cancerous juice on pressure. Similar soft enlargements were found in the anterior portions of the third and fourth left ribs. The lower lobe of right lung contained an infiltrated indurated mass, about the size of the fist, in some places of a yellow brown, and in others of a dirty grey colour. Some bronchial glands cancerous. Other thoracic organs healthy.

Abdomen.—Liver contained small, rounded, dirty white masses, principally at its circumference, varying in size from a small pea to that of a horse bean, and not projecting from its surface. Some of the gastro-colic glands were enlarged and cancerous. Other abdominal organs healthy.

Muscular System, wherever examined, and especially in the inferior extremities, was atrophied, but presented its normal colour.

Microscopic Examination.—The various encephaloid masses scattered throughout the brain, consisted of a vascular stroma, and a thick creamy juice. A drop of the latter contained numerous cancer cells in all stages of development, as repre-

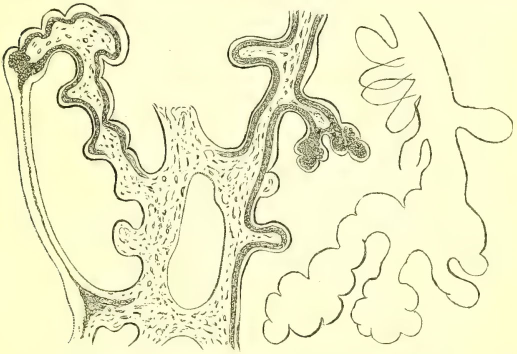
Fig. 371. Fig. 372.

Fig. 371. Peculiar vascular stroma with villi in the larger cancerous masses of the brain, acetic acid being added. The interstices were crowded with cancer cells.

Fig. 372. Gland-like expansions of stroma in other portions of the same mass. 80 *di.*

sented Fig. 260, p. 209. The stroma of the small masses consisted of a plexus of vessels of various sizes, crossing and inosculating with one another, many forming loops which were enlarged and crowded with blood corpuscles as in Fig. 107. In the larger masses the vessels had undergone development, by pushing out from their sides prolongations, which, subsequently uniting, formed a plexus (as seen in Fig. 370). During this process, however, another change had occurred, viz., an investment of these prolongations, which often assumed the form of acini in a gland, with a distinct membrane, in the interior of which was a vascular loop. It resulted that whilst some part of these masses contained a vascular plexus, with numerous cancer cells in a mesh-work, in others it exhibited a structure, now villous, and now approaching towards that of a gland. (Figs. 370, 371). This was evidently the "Cancer Stromata," so well described by Rokitanski, in some forms of encephaloma. The small cancerous nodule in the spinal cord presented the same structure as those in the brain. For the most part the nervous substance surrounding these masses was quite healthy; but here and there, in their immediate neighbourhood, it contained a few granule cells. The cancer of the lungs and bones presented the usual structure of encephaloma in those organs.

Commentary.—The occurrence of cancer in the brain is exceedingly rare; and the form of it above described was seen by me for the first time and examined with the greatest care. Its structure histologically was very interesting, and contrasted in some remarkable particulars with another well observed case recorded by Dr. Redfern of Aberdeen,* in which the stroma consisted wholly of shreds of cell membranes and granules. Before death, there were manifested both a cerebral and spinal disease. The former occasioned a peculiar perversion of the mind, consisting of a certain confusion of thought and incapability of carrying on ideas, whilst he answered questions readily and appeared perfectly conscious. Theoretically this is readily explained by the numerous circumscribed cancerous masses which may easily be supposed to have disturbed that continuity of transmission along the tubes so essential to vigour of mind. The spinal disease was indicated by local pain and incapability of supporting himself erect, symptoms attributable to the osseous disease and weakness. The paralysis of the right lower extremity may be owing to the nodule of cancer in the spinal cord opposite the dorsal vertebræ; but this is by no means certain. There was some difficulty in determining whether the indisposition to walk and powerlessness was owing to atrophy of the limbs or to a true paralysis. I am disposed to think that both causes co-operated.

DROPSY OF THE BRAIN.

CASE XXX.†—*Chronic Hydrocephalus—Paracentesis Capitis—No Benefit.*

HISTORY.—Esther Little, æt. 17 months, was admitted June 27, 1857. Her birth was natural, and nothing peculiar in the size or shape of her head was then observed. For two months her health was perfect; at this time she had convulsions, vomiting, and strabismus; her appetite diminished; her abdomen swelled, and there were frequent green slimy stools. She was under medical treatment for nine weeks, when she began to improve, and from that time her mother has noticed no deficiency in her appetite. When five months old a swelling appeared on left side of neck; it was lanced, and soon afterwards healed. But about this time also—twelve months ago—the size of the head attracted the attention of her parents; and from that day, up to admission, it has been gradually increasing. The child is thought by her parents to feel no pain in her head, but only inconvenience from its weight. She has not suffered from dentition, and has now cut ten teeth. She has not yet been weaned.

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* Monthly Journal of Med. Science. Dublin, 1850.

† Reported by Mr. W. Guy, Clinical Clerk.

Symptoms on Admission. — The child is not emaciated, the arms, legs, and body being well nourished; it often smiles, but the smile is readily converted into a querulous cry. It is fretful on the slightest change in the position of its head, which is too heavy for it to support. The head is of an irregularly square shape, the left side appearing to bulge posteriorly a little more than the right. The anterior fontanelle, 4 inches broad, and 9 inches at its greatest length, gives a distinct sense of fluctuation, being at the same time tense. The veins are seen with unusual distinctness coursing over the head. There are laminated scabs of chronic eczema over the scalp. The forehead is projecting. The eyes appear to protrude against the inferior eyelids, which cover the greater part of their surface. The upper lids are retracted slightly, and leave the sclerotic exposed. The lids are somewhat red. There is no strabismus; there is intolerance of strong light. The features of the face are well proportioned, and the cheeks bear a good deal of colour. The measurements of the head were found to be 24 inches at the greatest circumference (the girth on the left side being 12½), 15 inches across the head from ear to ear, and 16 inches from the frontal sinus to the occipital protuberance. On examination, the cardiac sounds are healthy, and the respiratory murmurs are natural. The tongue is moist and clean. The appetite is reported good. The child is not yet weaned, and is often at the breast; it, however, also gets milk, beef-tea, and bread. Its bowels are reported to be regular. The urine is passed in good quantity, but none has been obtained for examination. The mother has five living healthy children.

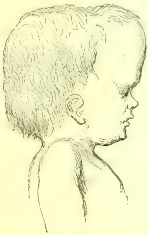
Fig. 373.

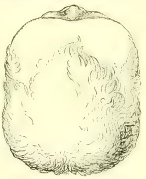
Fig. 374.

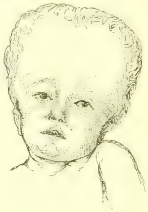
Fig. 375.

Figs. 373, 374, 375. Lateral, vertical, and front views of the head of Esther Little. In consequence of the well nourished face and limbs, the drawing does not convey to others an idea of the comparative size of the head so well as usually occurs in these cases.

Progress of the Case.—The hair being clipped close, the tincture of iodine had been painted over the scalp. *July 6th.*—To-day, about 1 p.m., tapping was performed by Mr. Syme. A small trochar being introduced to the depth of about one inch behind the posterior edge of the right os frontis, one inch to the right of the mesial line, five ounces of fluid were withdrawn. A compress was then applied over the puncture, and secured by strapping. Slips of diachylon plaster were also applied from side to side and obliquely, to effect gentle compression, and support was further given by a bandage passed round and across the head. There was very little crying on the part of the child. The fluid was clear as water; alkaline; sp. gr. 1009; depositing slowly, after being heated and acidified, a slight amount of albumen, and giving also (under action of sol. sulph. cupri, aqua potassæ and heat) a trace of grape sugar. *July 12th.*—Since the operation there has been no symptom of nervous excitement or derangement. On measurement of head to-day, the same measures were obtained as on admission. *July 14th.*—Yesterday, on again measuring the head, the same results were obtained. To-day, Mr. Syme again performed paracentesis, removing twelve ounces, the puncture being made on the left side at a point corresponding to the previous one on the right; the fluid exactly resembled that formerly drawn, but did not give the grape sugar re-action. The head was gently compressed while the fluid was flowing through the tube, and until, by means of strapping and bandage, equable pressure was applied to the cranium. The scalp was collapsed and puckered after the operation, and the bony margins of the fontanelle had considerably approached one another. *July 16th.*—Child has been more fretful; has passed less water; *ordered ten drops of sp. ether. nitrici thrice a day.* *July 17th.*—The urine has increased in amount. The child has recovered its usual health. *July 21st.*—To-day, the seventh since the operation, the bandages were removed; the coronal region felt full, and on measurement, the same numbers were obtained. *July 24th.*—Paracentesis was again performed; twelve ounces were removed, the fluid being faintly yellow; 1008 sp. gr., and otherwise identical in character with the fluid formerly withdrawn. At close of the operation rigors occurred, and the child looked pallid and faint. It was revived by wine and warmth; it partially vomited the wine; it was then kept at the breast, and by the evening it had regained its usual aspect. *July 25th.*—The urine again scanty; slept well last night; is exceedingly fretful, and does not incline to the breast. *July 26th.*—The fontanelle is again tense; urine still scanty; did not sleep well last night. *July 27th.*—Slept better; urine slightly increased, but none can be obtained for examination. *July 28th.*—Again slept better; appetite is returning; the child is still very fretful; but otherwise has no unusual symptom. The mother is anxious to return home, and a fourth paracentesis is not deemed advisable. The head was again measured, and found to be of the very same size as on admission. Discharged, *July 28th,* 1857.

Chemical Examination of the Fluid removed by Mr. Turner.

The fluid was especially examined with reference to the question whether it possessed the power of deoxidising the blue hydrated oxide of copper like grape-sugar. This property was possessed by the first specimen, the reduction to the state of suboxide taking place after boiling for a few minutes. No such re-action could, however, be obtained from the second portion, although the experiment was tried several times, both with the fluid as received, and also with it after it had been considerably concentrated by evaporation. The third specimen, however, exhibited the re-action in a more decided manner than the first. All three specimens contained albumen in small quantity. Heat and nitric acid causing it to fall down as a white flocculent precipitate. The following inorganic constituents were also found in the fluid in minute quantities :—Chloride of sodium ; phosphoric acid ; lime and magnesia.

Commentary.—The history of this case indicates, that two months after birth the child probably had an attack of acute meningitis at the base, from which she recovered. From this period dates the commencement of the hydrocephalus, a circumstance which induced me to suppose that the chronic exudation had in some manner compressed the blood-vessels, and caused dropsy. I have previously pointed out that such is the pathology of effusion following acute meningitis (p. 324), and there is every reason to suppose, that such is the explanation of the slow accumulation of fluid in the present case. With the exception of the cerebral disease, there was no other malady. So far as I could discover, there was especially no tubercular complication, which is generally so much to be dreaded in these cases, and all the functions were performed naturally. On the other hand, the mother assured me that the head was daily enlarging, and it was clear that, under no circumstances, if left to nature, would the child's existence be an enviable one. Under these circumstances I determined to try the effect of cautiously removing the fluid, and seeing whether the cause producing the effusion might not have ceased to operate, when assisted by diminished pressure. The first five ounces of fluid removed, produced no disturbance in the child whatever, and, encouraged by this circumstance, on the next occasion twelve ounces were taken away. On this occasion the head was greatly diminished, and the scalp considerably corrugated immediately after the operation. The head subsequently was carefully covered with strips of adhesive plaster in the manner recommended by Mr. Barnard, and the whole supported by bandaging. A few days afterwards, the child exhibited somewhat more restlessness, soon followed by a little unusual stupor. This I attributed to a re-accumulation of the fluid. On removing the bandages the head was found to be of the same size as on admission. Subsequently the scalp became very tense, and another twelve ounces were removed, followed by bandaging. On this occasion, however, the operation was followed by a rigor, but the child speedily recovered. The mother next day informed me that on this, as on the preceding occasion, the urine was diminished, although I had endeavoured to meet the possibility of this occurrence by the exhibition of nitric æther. This circumstance, however, convinced me that no benefit was to be anticipated by continuing the tappings, and the mother and child consequently returned home. I have since heard from Dr. Anderson of Selkirk, that a few days after returning to that town the child died, but as he was unfortunately absent at the time, he did not see her, and she was buried before his return. From an account of the symptoms which preceded death, furnished by the parents, it appears that there was no vomiting, unusual restlessness, strabismus, convulsions, paralysis, nor coma. But there was great disinclination to take food, pallor, and exhaustion. Had she remained in the Infirmary, these symptoms and the fatal results might have been prevented by the judicious administration of nutrients and stimulants.

The most satisfactory proof of the occasional benefit of tapping the head in cases of chronic hydrocephalus, is to be found in the paper of Dr. Conquest,* who at that time had operated in nineteen cases, and in ten of these successfully. He tells us that "all the operations were performed in the presence of many medical gentlemen, and most of them before large bodies of students at St. Bartholomew's Hospital." One of these cases, that of Catherine Seager, in its general details was very like the one now under observation. Two pints of fluid were removed by the operation, followed by a convulsion. Yet she was seen by Dr. Conquest, two years and a half afterwards, perfectly well, and in complete possession of all her intellectual faculties. With such facts before us, it is clear that the operation is warrantable when, from an absence of complication, there is a reasonable hope of success, as existed in the present case.

Should another case present itself to me, I would allow a longer time to elapse between the tappings. With this exception, I do not know, on a retrospective view of all the circumstances, that there was any point in its treatment that required modification. It would be a matter of great practical importance to determine, whether, as a rule, evacuations of the fluid are as useful in advancing as in stationary cases of chronic hydrocephalus. It is probable that the good effects described by Dr. Conquest were obtained in the latter kind of cases.

STRUCTURAL DISEASES OF THE SPINAL CORD.

CASE XXXI.†—*Slight Paraplegia—Recovery.*

HISTORY.—William Macpherson, æt. 33, a blacksmith, a very muscular and apparently strong man—admitted June 1, 1853. For two months past he has suffered from pain between the shoulders, in the legs, and over the body generally, and during the last three weeks he has been very weak, frequently feeling as if the arms and legs were benumbed. He has been an intemperate man, but never had delirium tremens, paralysis, or other disease.

SYMPTOMS ON ADMISSION.—There is no tenderness on percussion along the spinal column, and he only complains of pain between the scapulæ, shooting into both shoulders, increased by coughing and by motion. He says that both arms are very weak and benumbed, and that they often tingle, especially when he coughs. The arms are muscular, but the grasp he takes of an object is feeble, while the sensibility of the skin is decidedly diminished. Both arms are similarly affected. The legs also are very weak, more especially the left one, which "shakes" when he walks, especially if going down a hill. During progression the gait is unsteady, the left leg being jerked outwards in a semi-circle. He cannot turn round rapidly, and as slight difficulty in standing with the eyes shut. The sensibility of the skin ver the inferior extremities, as well as over the abdomen and thorax, diminished o the same degree as in his arms. Occasionally there are involuntary startings f the legs and arms, especially at night, which sometimes prevent his sleeping. In ll other respects the functions are normal. Appetite excellent. No constipation. ℞ *Ol. Olivar.* ℥ss; *Ol. Crotonis* ʒij. M. *ft. linimentum et inter scapulas applicetur.* ℞ *Hydrarg. Proto-iod.* gr. vj; *Ext. Hyosciam; Ext. Aloes,* aa ℈j. M. *et fiant pil.* xij. *Sumat unam ter in die.*

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* Lancet, vol. i. 1837-8, p. 890.

† Reported by Mr. Wm. M. Calder, Clinical Clerk.

Progress of the Case.—*June 6th*—Thinks himself somewhat better. Comlains that his diet is insufficient. *To have* 1 lb. *of beef tea in addition to ordinary iet.* From this time he gradually recovered, and was dismissed on the 17th, still a ittle weak, with the perfect use of all his limbs, and the sensibility normal.

Case XXXII.*—*Paraplegia—Partial Recovery.*

History.—Benjamin Robertson, æt. 42, a tailor—admitted July 11, 1853. States hat he enjoyed excellent health, until between three and four months ago, when he egan to experience a constant feeling of coldness in both feet, accompanied with a ertain amount of numbness. The diminution of sensibility gradually extended up oth limbs, and in the course of six weeks they were wholly affected. Together vith the numbness, the power of walking became impaired. This he attributes artly to want of muscular strength, and partly to the feeling of insecurity caused y the loss of sensibility. After the lower limbs had become involved, the fingers f both hands became similarly affected. Occasionally he has felt as if a belt were irmly bound round the loins and lower part of the chest. He has never had pain n the back, or tenderness on percussion along the spine. For the last ten years his abits have been temperate, but previously he was much addicted to intoxication nd venereal excesses. The treatment hitherto has consisted of counter irritation ver the back, and internally iodide of potassium.

Symptoms on Admission.—Has no pain anywhere, but sensibility is diminished n both lower extremities, more especially in the feet. His power of movement in he ankle joints and toes is unimpaired, but he has less command over the knee and ip joints. He is unable to draw up the limbs in bed beyond a certain point, but he left leg seems to be a little stronger than the other. He has no involuntary tartings of the limbs, but he has observed that they move about irregularly when riction is applied to them. He has great difficulty in walking, feeling as if his nee joints would bend under him, and before advancing he requires to steady himelf on one foot for a little. On shutting his eyes, he falls forward immediately. The fingers are constantly benumbed, but he can move them perfectly. Arms naffected. With the exception of defœcation, all the functions are normal; but on eeling an inclination to evacuate the bowels, he is obliged to comply instantly, or he fœces would pass involuntarily. ℞ *Strychniæ* gr. j; *Ext. Gent.* ʒss. *Micæ Panis, q. s. ft. Massa in pil.* xij *dividenda. Sumat unam ter indies.*

Progress of the Case.—The pills in the course of eight days produced nvoluntary startings of the inferior extremities, but the symptoms otherwise emained the same. ℞ *Ol. Olivar; Ol. Crotonis,* aa ℥ss. *To be rubbed over the ower half of the spine, morning and night. July 28th.*—His general health remains ood, and he thinks there is some amendment, although none is very perceptible. From this time, repose, good diet, and occasional counter-irritation, constituted the nly treatment, under which he gradually improved, so that *November 1st,* when he was dismissed, he was able to walk considerable distances with the aid of sticks, and a little even without them, although unsteadily.

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* Reported by Mr. Alexander Struthers, Clinical Clerk.

CASE XXXIII.*—*Paraplegia—Incurable.*

HISTORY.—Maximilian Saulsen, æt. 35, perfumer, native of Warsaw—admitted January 9, 1851. States that two and a half years ago he first felt a pricking followed by numbness in the toes of his right foot, which gradually extended, being accompanied by diminution of voluntary power over the parts. His left leg then became similarly affected. His general health was good. In 1849 he went to Germany, where he made use of the baths of Wiesbaden. Returning to England, he applied to one of the London dispensaries, and here he was cupped and galvanised without benefit. During last summer he went again to Germany. He says he could not walk on board at this time; but when he left for England in October last, he was obliged to be lifted on board, his legs being useless, while his arms were unaffected. During the passage back from Hamburg, two months ago, his left hand felt benumbed, and he could with difficulty use the fingers, except the little finger, which he says was unaffected. The right hand remained natural, with the exception of the little finger, which felt numb. Since then, the numbness in the feet and inability to move have increased very much.

SYMPTOMS ON ADMISSION.—On admission, his general appearance is healthy. He is unable to walk to any distance without the assistance of a stick. He is unable to direct the motions of his right leg without watching it. When he stands without support, great unsteadiness is observed; and when directed to close his eyes, he loses all control over his movements, and would fall to the ground if not prevented. He is unable to use the fingers of the left hand with any precision. Sensibility of the skin unimpaired. No headache; no tinnitus aurium; a little dizziness occasionally. Urine passed without difficulty; sometimes involuntarily during the night—1023 sp. gr. Complains of difficulty of defœcation. He was ordered to be cupped and blistered. These remedies, in conjunction with repose in the Infirmary, produced considerable amendment, and he was enabled to take long walks with the aid of a stick. On Friday the 10th, he passed a large lumbricus; and 40 grains of Pulv. Rad. Filicis Maris were ordered to be taken night and morning. No more worms, however, were evacuated. On February 23d, he was ordered one-twelfth of a grain of strychnine twice a day, which dose was increased to one-sixth on the 28th. On the 1st and 2d of March he was awoke several times during the night by startings of the limbs; and he stated that their general strength was diminished. He evidently staggered more in walking. Galvanic currents were then ordered to be passed from the spine down both limbs, under which treatment he continued until the 31st of March, when he was in no way better, and was discharged as incurable.

CASE XXXIV.†—*Paraplegia—Chronic Myelitis.*

HISTORY.—James Roy, æt. 34, a tailor—admitted September 20, 1847. States that about three months ago, he first observed slight unsteadiness in his gait, with a feeling of coldness in his lower limbs, which gradually increased. About a month afterwards, he became unusually constipated, with a want of power in expelling the fœces and urine. On the 15th, feeling unwell, though he had worked all day, he retired to rest earlier than usual, but feeling uncomfortable, he got up, and found he had little power in his legs. About 12 o'clock that night they became completely insensible. Next morning he had lost the functions of defœcation and micturition. A medical man bled him largely, removed the urine by catheter, and administered purgatives, which opened the bowels. He has remained in the same situation since, always feeling great faintness on assuming the erect posture.

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* Reported by Mr. Sanderson, Clinical Clerk.

† Reported by Mr. James Struthers, Clinical Clerk.

Symptoms on Admission.—All the parts below a line drawn round the body, on a level with the nipples, appear to be perfectly paralysed, deprived of all motility and sensibility. The inferior extremities present no rigidity whatever. Only the upper half of the chest moves during respiration; the lower half and the abdomen being fixed. There is retention of urine, which requires to be drawn off by catheter; and his bowels, which are very costive, are opened involuntarily in bed. Has a feeling of constriction round the chest, and still feels faint on being placed in the erect position. Temperature of the body everywhere natural. Pulse 90, of good strength. Other functions normal.

Progress of the Case.—The symptoms underwent no change, but he gradually became weaker. The treatment consisted at first of cupping over the vertebræ, and purgatives, and subsequently of the iodide of potassium internally, and wine. *October 12th.*—Diarrhœa came on yesterday, and he died this morning.

Sectio Cadaveris.—Twenty-five hours after death.

Spinal Cord.—Permission could only be obtained for the examination of this organ, which was exposed from the first cervical vertebræ downwards. The membranes were healthy. Scarcely any arachnoid fluid. About seven inches of the cord in length, corresponding to the second and third dorsal vertebræ, felt unusually soft. Externally the softening was of a dirty gray colour, and pultaceous in consistence, but the centre was quite diffluent, and of a yellow colour, resembling pus. Above and below the circumscribed morbid portion the cord was healthy. No disease of vertebræ.

Microscopic Examination.—The external gray softening consisted of fragments of the nerve tubes, and globules, with double lines of various sizes and forms, mingled with numerous granule cells and granules. The central softening consisted almost wholly of numerous granule cells and fatty molecules, fragments of tubes being comparatively small in quantity.

Commentary.—The four preceding cases present the same disease in different stages, that disease being chronic myelitis, by far the most common lesion of the cord met with. Cases XXXI. and XXXII. show the occasional good effects which result from rest, counter-irritation, and supporting the nutrition in incipient cases. Bleeding and antiphlogistics I have never seen beneficial, but frequently injurious; and in Case XXXIV. depletion evidently added to the prostration of the patient. In the more chronic or intense cases, nothing but palliatives are of any service. I have tried galvanism and strychnine; but have never found them of any avail where the cord was undoubtedly diseased. Indeed, under such circumstances, it has frequently appeared to me that strychnine renders the weakness of the patient greater, as in Case XXXIII. In the last stages of the disease, if chronic, and especially if sloughs have formed on the back, our whole efforts should be directed to nurse and sustain the patient's strength, and alleviate the symptoms which arise from the paralysed condition of important organs. Hence rest, nourishing diet, and tonics, are the best remedies, while the hydrostatic bed and every other contrivance should be put in practice to remove pressure from the depending parts of the body. Mild aperients should be employed from time to time to overcome the intestinal torpor, while by the catheter the urinary bladder should be evacuated, so as to diminish the tendency to saline precipitation in that viscus, and its subsequent disorganisation.

I have given phosphorus in seven cases of paraplegia from chronic myelitis, all resembling more or less Case XXXIII., in the form of phosphuretted oil (4 gr. of phosphorus dissolved in ℥j of olive oil). In none of these cases have I been able to satisfy myself that any improvement was occasioned. I commenced with three drops a-day, which were afterwards cautiously increased to ten, and in one case to fifteen drops. But these large doses soon induced violent nausea and vomiting, and after a short suspension of the remedy, I have continued it for several weeks in doses of three drops. In the case which took fifteen drops thrice daily for two days, the phosphorus was excreted by the lungs, as the breath smelt strongly of the drug, but was not phosphorescent at night—a phenomenon which has been seen by some physicians who have employed it. In another case, that took ten drops thrice one day, a large amount of phosphate was passed in the urine, presenting, under the microscope, beautiful feathery crystals, which disappeared on discontinuing the drug. From the trial I made of phosphorus, it seemed to me of little benefit, and that the dose of phosphuretted oil should never exceed five drops. Even this amount cannot be administered for any length of time without deranging the stomach.

The cord undergoes the same structural changes as the brain, and after death, in cases of true myelitis, exudative softening may readily be demonstrated by the microscope. (See Fig. 106.) Softening from imbibition of serum, however, is rare, whilst that from mechanical crushing with instruments after death is exceedingly common, and should always be carefully investigated by the pathologist. Spinal meningitis and hemorrhage are rare diseases—the former generally resulting from an extension downwards of cerebral meningitis. I have only seen one case of spinal hemorrhage, and that occurred in the surgical ward of Mr. Miller. It occurred in a woman, who, when tipsy, was kicked by her husband in the neck, immediately causing sudden paralysis of all four extremities, and of the trunk. She died in four days, and, opening the body, I found a clot of blood the size of a pea in the centre of the cord immediately below the medulla oblongata, opposite the second vertebra. The external portion of the cord, and the vertebral bones were unaffected. On microscopic examination, the clot was composed of recently extravasated blood corpuscles, surrounded by mechanical softening.*

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* An interesting case of true spinal hemorrhage, with an account of all the known cases, is given by Dr. Peddie, Monthly Journal of Med. Science, May 1847, p. 819.

CASE XXXV.*—*Paraplegia—Tubercular Caries of Dorsal Vertebræ—Myelitis—Pulmonary Tubercle.*

HISTORY.—William Walker, æt. 42, mason—admitted October 17, 1850. States that for upwards of twelve years he has suffered from occasional cough, usually dry, accompanied in lower and middle part of chest with pain, which extended back to the dorsal vertebræ. The pain and cough have, within the last three months, become more constant, and accompanied by nightly perspirations. About fourteen days before admission, he felt a prickling and coldness in the feet, and an unsteadiness in walking, especially in the left foot. Two days before admission, after a long walk, these symptoms were augmented. Since then they have gradually increased, so that now he has no power over his legs beyond bending the knee very slightly. Sensibility of the integuments not impaired.

SYMPTOMS ON ADMISSION.—On admission, looks emaciated, and anxious. Complains of no headache, or pain in spine, save between the shoulders. He cannot stand without support, and when he tries to walk he staggers, and would fall if not supported. He can move his legs in bed with tolerable freedom ; they often feel cold. Superior extremities unaffected. There is occasional cough, with scanty expectoration. On percussion no dulness is perceptible, on either side, anteriorly. On auscultation, the respiratory murmurs are harsher and louder than natural at apex of both lungs. The urine not albuminous, but loaded with lithates, and sometimes voided with difficulty. Other functions healthy.

PROGRESS OF THE CASE.—The paralysis in this man gradually increased. He could not stand, although, when in bed, he could slightly bend the knees and toes. Latterly a swelling formed over the lower dorsal and upper lumbar vertebræ, five inches long and three broad. The urine became loaded with phosphates, and, with the fœces, was passed involuntarily. His general health also greatly diminished, painful twitchings occurred in the paralysed limbs, emaciation became extreme, the cough violent, the expectoration copious. Several sloughs formed over the left and right hips, notwithstanding he lay on a water bed, and every care was taken to prevent them. During the last week in February, and two first weeks in March, an abscess formed above the right clavicle, which opened spontaneously on the 15th of the last-mentioned month, and discharged about 8 oz. of matter. As the respiratory murmur was still heard at the apex of right lung, it was concluded that the abscess originated in the vertebral column. A considerable quantity of pus was subsequently discharged daily, being forced out at each inspiration. *March 24th.*—He was greatly exhausted, pulse weak and irregular ; low muttering delirium at night, with scarcely strength to expectorate. Died the same evening. The treatment consisted at first of a few leeches occasionally applied to the back, of purgatives, and latterly of remedies applicable to spinal symptoms, which produced merely temporary relief.

Sectio Cadaveris.—March 26.

The body was pale, and greatly emaciated.

Over the left hip was a sloughing sore, measuring seven inches in its longest diameter from above downwards, and six inches across. The surface irregular, in some places an inch below the level of the skin, and the whole covered with a dirty greenish ichorous matter. Over the right hip was a smaller slough, of roundish form, about two inches in diameter. Over the vertebral column, between and somewhat above these sloughs, there was a circumscribed swelling, of an oval form, five inches long and three inches broad. It was firm and dense to the feel, and on section was found to consist of thickening of the dermis to the extent of three quarters of an inch, combined with œdematous infiltration of the cellular tissue. Opposite to the seventh cervical and first and second dorsal vertebræ, there was a slight angular curvature of the spinal column, in the centre of which space externally the skin presented a small purplish discoloration. A fistulous opening, the size of a fourpenny piece, existed about two inches above the centre of the right clavicle. On tracing the opening inwards, it led into a cavity which passed behind the subclavian vein, and from thence backwards to the tubercle of the first rib, which could be felt carious and rough, and from thence to the first four dorsal vertebræ, the bodies of which bones were carious throughout. The periosteum had separated from the diseased bones, and formed a pouch anteriorly, filled with pus, which communicated with the external sinus. On examining the diseased bones, their cancellated structure was more or less infiltrated with pus, combined with soft tubercular exudation. The posterior laminæ of the first dorsal vertebræ especially were, from the latter cause, of cheesy consistence.

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* Reported by Mr. Sanderson, Clinical Clerk.

Spinal Cord.—The membranes were healthy. Externally the spinal cord presented no appearance of disease. On making a longitudinal section, however, it was found to be distinctly softened internally an inch of its length, opposite the first dorsal vertebræ. The softened white structure encroached more on the anterior white matter of the cord than posteriorly, and it was of slight fawn colour.

Thorax.—The pleuræ were united by firm adhesions at the apices of both lungs, and also over the middle on the left side. At the apex of the right lung, the pleuræ were also thickened in several places, presenting a white appearance, and the tissue of the lung opposite was much puckered. On section, these puckerings were found to correspond to calcareous concretions, of various sizes, around which numerous hard miliary tubercles, of a slate colour, were grouped. Throughout this lung were numerous similar tubercles, mingled with black pigment deposits and calcareous masses, varying in size from a millet seed to that of a small pea,—most abundant, however, at the apex. Similar tubercles existed in the upper lobe of left lung; but they were not so numerous. The bronchial mucous membrane was much congested; and the larger bronchi contained a copious mucopurulent fluid. The bronchial glands were of black colour, and here and there loaded with calcareous matter.

Abdominal organs healthy.

Microscopic Examination.—The softened portion of the spinal cord consisted of numerous molecules and granules, with the debris of the varicose nerve-tubes of the cord, forming globules of various sizes and shapes, of the white substance of Schwann. Large numbers of compound granule cells and masses were associated with the disintegrated structures.

Commentary.—The preceding case is dependent on a different pathological cause, and presents consequently marked variations in the symptoms from the former instances of paraplegia. In it, pressure was gradually made on the spinal cord from without, in consequence of scrofulous caries. The anterior columns of the cord, under such circumstances, are those which are most injured, and loss of motion is the leading symptom. In Cases XXXI. to XXXIV., the first symptoms were numbness or pricking of the toes, followed by perversion or irregularity, rather than loss of motion, and not attended with spasms. This condition is indicative of chronic inflammation of the cord or myelitis.

Professor Romberg has pointed out a symptom in such persons, which he considers diagnostic of softening of the gray matter in the centre of the cord, as distinguished from lesion of the white matter. This consists in ascertaining that a man cannot stand steadily with his eyes shut. This symptom was well marked in Cases XXXII. and XXXIII., and slightly in Case XXXI., while everything indicated that it was not so much the conducting, as the tonic power, which was wanting. These considerations induced me to try the effects of strychnine, which, however, was of no benefit in Case XXXII., and in Case XXXIII. increased the irregular movements when walking, and caused loss rather than increase of power. The galvanic currents, which were subsequently tried, also failed in producing any amendment. In Case XXXV. the caries of the spinal column, but more especially the discharge from the fistulous opening, produced the fatal termination. The tubercles in the lung were all in a chronic condition, and although they, combined with the bronchitis, account for the cough and physical signs, they also served during life as indications of the kind of caries present in the vertebral column. The deformity in the dorsal region was only observable a few days before death, and became more marked afterwards. The swelling in the lumbar region was a singular proof of the effects occasionally produced by deep-seated sloughs and cicatrices, in causing local hypertrophy and œdema.

Scrofulous or tubercular caries of the bones is a common cause of paraplegia, and considerable difference of opinion exists as to its mode of treatment. It has been maintained, for instance, that caries of a spongy bone never heals, and that where it can be reached the only remedy is excision. But it has frequently happened that change of air and an improved diet have led to the most happy results, and that the caries has healed spontaneously. Every practitioner of experience must have met with cases where caries and distortion of the vertebræ have terminated in anchylosis, and the patient regained his health. Many dwarfs are living examples of scrofulous caries having occurred in the spongy portion of bones when young, which had disappeared, leaving them, although deformed, quite well. The theory, therefore, to which I have alluded is incorrect; and although indirectly it has led to many improvements in surgery, by causing excision of bones and joints, instead of amputation of limbs, or allowing the patient to sink from exhaustion, there can be no doubt that, notwithstanding, many cases recover under a proper constitutional treatment. Thus I have seen some remarkable instances of caries and distortion of the vertebræ, which have produced perfect paralysis, and reduced the patient to a great state of weakness. Under such circumstances, instead of confining the patient to bed, under the idea that the weight of the body would increase the curvature, I have recommended moderate exercise, given cod-liver oil and nutrients, and the patient has ultimately recovered. During a visit I paid to Germany in 1846, I saw in the wards of Professor Heusinger of Marburgh three such cases at once. They had all had paraplegia. The one most recently treated still had paralysis, the other two, who had been under treatment some months, had recovered, so that they could walk without difficulty, and were nearly well. I saw shortly after, two similar cases in the wards of Professor Jacks of Prague. Hence I am satisfied that our treatment in all such cases should be from the first nutritive and supporting, avoiding depletion and lowering remedies, and insisting on exercise as far as possible by walking or in a carriage. In this way not only may a cure be effected, but in advanced cases health sustained and life prolonged, while the tendency to the production of those sloughs on the back, which so commonly hasten the fatal result, is best prevented.

CASE XXXVI.*—*Paraplegia—Cancer of Vertebral Bones—Softening of the Cord from Pressure—Cancer of Lung, Liver, and Lumbar Glands—Ulceration of Urinary Bladder.*

HISTORY.—Agnes M'Guire, æt. 60—admitted January 12th, 1849. With the exception of two attacks of fever, had always enjoyed good health until three months ago, when she was seized during the night with nausea, vomiting, and purging These symptoms continued more or less until a fortnight since, when she first became aware of a feeling of coldness in the lower extremities, especially in the feet and toes. Six days ago, on waking in the morning, she found that she had completely lost all power over the lower extremities, and had a feeling of great weight in the haunches and lumbar region.

SYMPTOMS ON ADMISSION.—There is great emaciation. The countenance is expressive of pain and anxiety. Face and lips pale and sallow. Skin cold and harsh. There is a black slough about three inches in diameter over the sacrum. She complains of pain in the breast, chest, and back, and there is tenderness over the abdomen and sides, with tympanitic distension. There is total loss of motor power, and of sensibility from the haunches downwards; but on pricking the soles of the feet, slight spasmodic muscular movements occur. All attempts to move the body, even by others, cause great pain, especially in the lumbar regions. No cough nor expectoration. Percussion and auscultation over the anterior surface of the chest elicit nothing abnormal; the posterior surface cannot be examined in consequence of the difficulty of moving her. Heart healthy; tongue furred; appetite irregular; considerable thirst and occasional nausea. Has passed urine and fœces involuntarily since admission, but says she is generally costive. Urine abundant, and when removed by catheter, is of a brick colour, with a dark sediment, composed of amorphous urates, triple phosphate epithelial cells, and blood corpuscles. It is readily decomposed and has an ammoniacal odour.

PROGRESS OF THE CASE.—This woman gradually became more and more exhausted. The slough on the back became enlarged, the tympanitic condition of the abdomen, with pain there and in the back, underwent occasional remissions, but on the whole never left her. The urine could never be passed voluntarily, and gradually became more loaded with phosphates, blood, and epithelial cells, and emitted an intolerably fœtid odour. The bowels for some time were constipated, but diarrhœa ensued shortly before death, which took place February 5th. The treatment consisted at first of the occasional application of leeches to the painful portion of the vertebral column, but they never caused even the slightest relief. The constipation was overcome by laxatives, and the urine frequently drawn off by catheter. The slough was constantly dressed with turpentine and balsamic ointments and poultices, and pressure removed from it as much as possible. Warm bottles were frequently applied to the feet and lower extremities, but they could never overcome the feeling of cold which prevailed. Internally, nutrients with wine, and latterly brandy, were given.

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* Reported by Mr. J. N. Fanning, Clinical Clerk.

Sectio Cadaveris.—Twenty-five hours after death.

HEAD.—Brain and membranes healthy.

SPINAL COLUMN.—The bodies of the eighth and ninth dorsal vertebræ were much thickened, presenting an abrupt swelling, and on section were soft from infiltration of encephaloma. The left psoas muscle was adherent to the bodies of the diseased vertebræ, and formed with these a pultaceous disorganised mass, consisting of fatty softened muscle, and broken down cancerous bone. The body of the third lumbar vertebra was also infiltrated with encephaloma.

SPINAL CORD. — The diseased dorsal vertebral bones had encroached considerably on the spinal canal, and formed somewhat of an acute angle compressing the cord, which, for the space of one inch opposite them, was reduced throughout to a pultaceous consistence. The softening was white, and the membranes surrounding it were healthy.

CHEST.—In the left auricle of the heart was a hemispherical, flattened, earthy concretion, the size of an almond, embedded in the muscular wall. Heart otherwise healthy. Lungs anteriorily emphysematous. The left lung adherent at the apex posteriorly, on separating which, half of the upper lobe posteriorly was seen to be infiltrated with encephalomatous exudation of a dirty white, and in some places a light pink colour. Throughout other portions of both lungs, nodules of similar encephaloma were disseminated, varying in size from a pea to that of a walnut, and separated by perfectly healthy lung tissue. Bronchial glands of a blackish colour, from deposition of pigment, but not cancerous.

ABDOMEN.—The liver, kidneys, and lumbar glands were studded with masses of soft cancer, varying in size in the first-named organ from a hazel nut to that of a pigeon's egg. The urinary bladder was much contracted and corrugated. The inner surface was rough, in consequence of red bloody projections from it, varying in size from a millet seed to that of a pea. In other places there were injected rugæ, with cracks and ulcerations in the depressions, and considerable depositions of phosphatic salts. The spleen and other organs healthy. Considerable flatus in the large intestines.

MICROSCOPIC EXAMINATION.—The softened spinal cord consisted of the nerve tubes broken up into minute fragments of various shapes, round, oval, flask-shaped, etc., with double outlines, mingled with a multitude of fatty molecules and granules. A few granule cells were also visible. The cancerous masses in the lung presented broken-up cancer cells, intermixed with numerous granule cells and granular matter, as in the *Cancer reticulare* of Müller. In the liver, more characteristic cell structures were found; still, however, here and there mixed with retrograde cancerous masses of a yellowish colour. In the bones the cancer cells were large, many of them containing two or three nuclei undergoing development.

Commentary.—In this case, encephaloma of various internal organs came on slowly, without causing any distinctive symptoms, until the enlargement of the eighth and ninth dorsal vertebræ from cancerous infiltration, by pressing on the spinal cord, occasioned incipient symptoms of paraplegia. The two softened vertebral bones, however, sunk suddenly inwards, compressed the cord, and occasioned in the night complete paralysis, followed sometime afterwards by ulceration of the bladder and sloughs on the sacrum, which caused her death. On dissection, the bodies of the two vertebræ were seen to form an angle, compressing the cord, which was afterwards reduced to a pulpy consistence, and entirely disorganised. Thus softening of the spinal column caused sudden complete paraplegia, in consequence of the bones giving way and crushing the spinal cord.

The importance of rightly understanding the pathology of structural diseases of the spinal cord will be appreciated on reflecting that they generally induce incurable paralysis. Its extent will be greater or less, according as the lesion involves the origin of a greater or less number of nerves, or what amounts to the same thing, cuts off their intercourse with the brain. The recent views of the structure of the cord (pp. 112, 113), further point out to us, that disorganization of the grey matter not only diminishes the evolution of nervous force, but acts directly on the fibres which transmit it to the brain. There is every reason to believe that these fibres not only decussate in the medulla oblongata, but do so all the way down the cord. So small, however, is this latter organ, that diseases of its texture usually affect both halves, and occasion effects on both sides of the body, whereas it has long been a matter of observation, that a lesion on one side of the brain causes paralysis on the opposite side of the body. Hence, in cases of hemiplegia, the disease in the vast majority of cases is referable to the opposite hemisphere of the brain, more especially to the cranial portion of the spinal cord above the decussation in the medulla oblongata; whereas paraplegia is as frequently found to depend on disease of the vertebral portion of the cord below that decussation.

A very few cases have been recorded, however, in which hemiplegia has occurred on the same side as a lesion found in the brain after death, and which has been supposed to occasion it. Mr. Hilton, indeed, in a paper read before the Royal Society in 1837-8, described a disposition of fibres which he thought capable of explaining such exceptional cases. These, however, are so rare, that it can scarcely be supposed to arise from a permanent anatomical arrangement, and it is far more probable that even in them there is, in fact, no exception to the general law. Thus, numerous instances have occurred of abscesses softening and other morbid changes having been found after death, but in which there was no paralysis during life; and a still greater number are on record, in which there was well-marked paralysis during life, but no appreciable change in the structures after death. It is by no means improbable, therefore, as paralysis may be induced without leaving any traces, that in these few cases it was caused by unknown changes in the opposite hemisphere of the brain;

and, as is sometimes the case, that the lesion found in the hemisphere of the paralysed side had produced no effect. Such, we think, is the most probable explanation of these exceptional cases.

In the vertebral portion of the cord, although the general rule is, that all those parts are paralysed, furnished by nerves coming off below the seat of disorganization, exceptional cases also have been recorded. In these it has been said that individuals have retained the power not only of moving the lower limbs, but of walking, notwithstanding that the spinal cord has been disorganized throughout its entire thickness. Every one accustomed to pathological examinations must receive with distrust accounts of such observations, knowing how soon this portion of the nervous system may, in certain cases, become softened after death, as well as the injuries it is likely to receive in opening the vertebral canal. Several years ago, I took the trouble to analyse the more remarkable of these cases, and satisfied myself that there was no absolute proof that in any of them the cord was wholly destroyed during life.

Thus, in the celebrated case of Desault (*Journ. de Chir. de Desault*, tom. iv. p. 437), the appearance of the parts is not described: it is merely stated, "the spinal marrow was totally divided;" and the movements which took place are thus narrated :—"He was in a continual agitation, and moved the pelvis and inferior extremities even to the last." In all this there is nothing decided. May not the movements have been excito-motory? Was the altered structure well observed? The case of M. Rullier (*Journ. de Physiol.*, 1823) has been also frequently alluded to in connection with this question. It was that of a gentleman who had complete and perfect paralysis of the arms, without loss of sensibility and motion in the inferior extremities; he remained in this state six years, and died of pectoral complaints. Dr. Abercrombie, alluding to the case, states that a portion of the cord, six inches in length, occupying two-thirds of the cervical portion and part of the dorsal, was entirely diffluent; so that, before the membranes were opened, it moved upwards and downwards like a fluid. The posterior roots of the nerves of this portion preserved their nervous matter to their junction to the membranes of the cord; but in the anterior roots it was destroyed, and they were reduced to an empty neurilemma. (*Abercrombie*, p. 350, 3d edit.) This writer mentions that the anterior columns were completely destroyed, and others in alluding to the case have thought a portion of the cord was entirely disorganized. The case itself is headed, *Disappearance (Disparition) of the Nervous Substance of the Spinal Marrow in the Superior Third of the Dorsal Portion* (*Ollivier*, 3d edit. vol. ii. p. 368), and yet, in the details of the dissection it is stated, "On voyait à peine, vers la partie antérieure de cette portion altérée, les cordons médullaires en rapport avec les racines correspondantes des nerfs spinaux;" and again, "Cette altération était beaucoup moins sensible lorsqu'on régardait la moelle par sa face antérieure," etc. From this it would appear that certain continuous fibres still existed in the anterior columns, although they were seen with difficulty, but that there could be no doubt many existed in the posterior. The persistence of voluntary motion and sensibility in the inferior extremities under such circumstances, when the disease too was chronic, is in no way surprising.

Instances have also been recorded, in which balls have traversed the vertebral column; or swords have been thrust into the neck, which are said to have entirely cut across the spinal cord, without being followed by paralysis. We cannot here enter into the analysis of these cases, but those who choose to do so will readily come to the conclusion, that no positive proof exists that the cord was wholly destroyed during life. On the other hand, without throwing any doubts on the accuracy of the observations which have been made, may we not consider that the complete destruction which has been described, is in some degree a post-mortem appearance caused by partial softening of the cord, mixing after death, perhaps, with the serous fluid always present? Is it not probable that the necessary violence in opening the vertebral canal may have broken across the fibres, which during life were entire? Again, may not the movements described in many cases have been excito-motory? At all events we consider that, in the present state of science, such views are much more rational than to suppose that the influence of volition can leap over four or five inches of disorganised spinal cord in order to reach the inferior extremities, or that impressions made on the latter can be communicated to the brain by other channels than the nervous system.*

FUNCTIONAL DISORDERS OF THE NERVOUS SYSTEM.

CASE XXXVII.†—*Partial Amaurosis—Spectral Illusions—Perversions of Hearing, Smell, and Touch—Spinal Irritation.*

HISTORY.—Mrs. M'Kenzie, æt. 35—admitted December 30, 1850. Has been travelling companion to a lady, and always been a delicate and highly nervous person. Nine years ago she had rheumatic fever, and twelve months afterwards her sight became impaired, owing, she supposes, to too much reading at night with gas light. For this she was freely bled and blistered, and was subjected to a long antiphlogistic treatment by an oculist, without benefit. About the same period the menses became irregular, leucorrhœa was established, and there was great spinal irritation. For these latter complaints I prescribed for her several times, and getting better, she went to Canada. From thence she returned four months ago, and feeling weak, the menstrual discharge also having been excessive during the last four months, she entered the Infirmary.

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* See the Author's Article on Paralysis, Library of Medicine. Vol. ii.

† Reported by Mr. Henry Thom, Clinical Clerk.

Symptoms on Admission.—On admission, she complains of headache and pain in the epigastrium, darting round the left side, and extending to the back. Pressure over the fourth and fifth dorsal vertebræ, corresponding to the painful part, causes acute pain. There is also slight tenderness over the lower lumbar vertebræ. The left pupil is slightly dilated, and vision is much impaired. She does not look straight forward at any object placed before her; both eyes being turned to the left of it. almost at right angles. She is much troubled with ocular spectra. She thinks she sees wild animals, flower gardens, oil paintings, and children dancing before her, dressed in clothes of various colours. She frequently experiences noises in the ears, and especially one like the ringing of a small hand-bell. The sense of smell is also perverted; a box of strong snuff, for instance, when placed below her nose, having apparently the odour of tea. The sense of taste is not altered. The sense of touch is capable of being perverted by suggestive ideas. On placing a cold piece of metal in her hand, and telling her it was warm, she declared that it was so. Voluntary motion is also impaired. On being addressed suddenly she starts; and on endeavouring to grasp an object, makes several ineffectual efforts to do so. At the same time, there is considerable tremor and twitchings of the muscles of both arms. There is also great difficulty in walking, from a sense of being pressed down by a heavy weight placed on her shoulders. The tongue is pale, furred, and cracked; there is an acid taste in the mouth, frequent slight difficulty of deglutition, and occasional vomiting about half an hour after taking solid, but not liquid, food. The bowels are opened very irregularly, and there is in general constipation, The urine has a specific gravity of 1005—not coagulable. The menstruation is irregular, and has been latterly profuse. During the last six months it has appeared five times. In the intervals, there is abundant leucorrhœa. On examination with the speculum, the os and cervix uteri were found tumefied. There was no ulceration, but copious discharge of purulent matter from the os uteri. The sounds of the heart are natural. Pulse 60, soft. Other organs healthy. *A tepid bath was ordered every morning. To use also a vaginal injection of* ʒj *Aluminis to* ℥viij *of water; and to have the following mixture:*—℞ *Ferri Citratis*, ʒss; *Tr. Card.-Comp.* ℥j; *Tr. Aurantii* ℥ss; *Infus. Columb.* ℥iv *s.*, M., ℥ss *to be taken three times a day.*

Progress of the Case.—Under this treatment, and with an occasional laxative, her general health greatly improved. The menorrhagia ceased. The headache diminished; the appetite improved. The spectral and aural illusions ceased to appear, and on the 19th of February she insisted on going out.

Commentary.—In this case, conjoined with spinal irritation, there was imperfect amaurosis, one point of each retina only retaining its sensibility to light, which point she brought into the axis of vision, by directing both eyes to the left of, and at right angles with, the object examined. With the exception of taste also, all the other senses were more or less perverted. At the same time, the digestive and uterine functions were much disordered; and it was observed in this, as it has been in numerous similar cases, that as her general strength improved and the dyspnœa and menorrhagia diminished, so did the spectral and aural illusions and other perversions of the nervous system disappear. This fact points out how cautiously the treatment of these cases should be conducted in the first instance, and how dangerous the bleedings, cuppings, purgings, mercurials, etc. etc., must be in certain cases of incipient amaurosis, when these are practised (as they too often are) without discrimination or reference to the constitutional powers of the patient.

Another curious phenomenon was observed in this case—namely, that her sensations were capable of being governed to a certain extent by suggestive ideas. That is to say, on calling attention to a particular object placed in her hand, and asserting that it was hot or cold (although in reality it was neither), corresponding sensations were produced in her mind. This peculiar condition of the nervous system is one which, it appears to me, is more deserving the attention of medical men than they have hitherto paid to it. It is well known to numerous charlatans, who have ascribed the phenomena so produced to an external power or force, which they could wield at pleasure. Such ideas have done much to shock the minds of physiologists and medical men, and prevent the proper appreciation of many important facts. Believing, however, that these facts are capable of being explained on physiological principles, and are capable of being rendered serviceable in practical medicine, I would direct your attention to them in a special manner. (See p. 289, *et seq.*) In no case I ever saw was the inutility of antiphlogistics, mercury, and other modes of active treatment better demonstrated, even to relieve the amaurosis, for which they were used. In fact, not only the disorder of the retina increased, but so much was the weakness augmented, as apparently to induce almost every other form of nervous disorder. On admission to the house her condition was pitiable, and from this she was restored by rest, good diet, chalybeates, cheerful conversation, and confident predictions of her recovery, which evidently had a powerful influence in calming her mind, and diminishing the nervous symptoms.

The functional derangements of the nervous system are capable of assuming at various times every conceivable disorder of intelligence, sensation, and motion, so that not only may all kinds of diseases which have received names be simulated, but the symptoms may be so curiously combined as to set all arbitrary nosological classifications at defiance. If it be farther remembered that through the brain, spinal cord, and nerves, the functions of every organ in the body may be more or less influenced, the endless variety of local as well as of general derangements may perhaps be imagined. To illustrate each of these numerous forms of disease by cases is, in a clinical course, impossible; although the wards always present a variety of examples of perverted nervous function. I shall content myself, therefore, with giving a classified enumeration of these disorders, and then dwelling more especially on their pathology and treatment.

The functional disorders of the nervous system may be classified into—1st, Cerebral; 2d, Spinal; 3d, Cerebro-spinal; 4th, Neural; and 5th, Neuro-spinal; according as the brain, spinal cord, or nerves are affected alone, or in combination. Aberrations of intellect always depend on cerebral disturbance; while perversions of motion and sensibility, if extensive, indicate spinal; and if local, neural disorder. Thus insanity and apoplexy are cerebral; tetanus and chorea, spinal; epilepsy and catalepsy are cerebro-spinal; neuralgia and local paralysis are neural; and all combined spasms, dependent on diastaltic or reflex actions, are neuro-spinal. The following enumeration of nervous disorders, with the meanings that ought to be attached to them, will at the same time serve the purposes of definition and of nosological distinctions.

Classification of Functional Nervous Disorders.

I.—CEREBRAL DISORDERS, *in which the cerebral lobes (or brain proper) are affected.*

1. *Insanity*, or mental aberration in its various forms, not organic, including *delirium.*
2. *Headache* and other uneasy sensations within the cranium, such as lightness, heaviness, vertigo, etc. etc.
3. *Apoplexy.* Sudden loss of consciousness and of voluntary motion commencing in the brain. The absence of consciousness necessarily involves that of sensation. The same condition as regards nervous phenomena exists in *syncope* and *asphyxia*, but the first of these commences in the heart, and the second in the lungs. Allied to apoplexy is coma or stupor, arising from various causes affecting the brain, such as pressure, or poisonous agents like alcohol, chloroform, opium, etc. etc.
4. *Trance*, or prolonged somnolence, either with or without perversion of sensation or motion. To this state is allied *ecstasy*, or unconsciousness with mental excitement.
5. *Irregular motions*, *spasms*, etc., originating in excited or diminished voluntary power, as in certain cases of *dominant ideas*, *somnambulism*, *saltatory movements*, *tremors*, etc., or on the other hand *incapability of movement* from languor, surprise, mental agitation, etc. etc.

II.—SPINAL DISORDERS, *in which the cranial and vertebral portions of the spinal cord are affected.*

1. *Spinal irritation.* Pain in the spinal column, induced or increased by pressure or percussion, often associated with a variety of neuralgic, convulsive, spasmodic, or paralytic disorders affecting in different cases all the organs and viscera of the body, and so giving rise to an endless number of morbid states.
2. *Tetanus.* Tonic contraction of the voluntary muscles. *Trismus*, if confined to the muscles of the jaws. *Opisthotonos*, if affecting the muscles of the back, so as to draw the body backwards. *Emprosthotonos*, if affecting the muscles of the neck and abdomen, so as to draw the body forwards; and

Pleurosthotonos, if affecting the muscles of the body laterally, so as to draw the body sideways.

3. *Chorea.* Irregular action of the voluntary muscles, when stimulated by the will.
4. *Hysteria.* Any kind of perverted nervous function, connected with uterine derangement. Nothing can be more vague than this term.
5. *Hydrophobia.* Spasms of the muscles of the pharynx and chest, with difficulty in drinking and dread of fluids.
6. *Spasms* and *convulsions.* Tonic and clonic contractions of the muscles of every kind and degree, not included in the above, originating in the cord (centric spinal diseases of Marshall Hall).
7. *Hemiplegia.* Paralysis of a lateral half of the body, generally dependent on disorders of the cranial portion of the spinal cord above the decussation in the medulla oblongata.
8. *Paraplegia.* Paralysis on both sides of the body, generally the lower half, in consequence of disorder of the vertebral portion of the spinal cord, below the decussation in the medulla oblongata.

III.—CEREBRO-SPINAL DISORDERS, *in which both cerebral lobes and spinal cord are affected.*

1. *Epilepsy.* Loss of consciousness with spasms or convulsions occurring in paroxysms. *Apoplexy with convulsion or paralysis* is also cerebro-spinal, though generally organic.
2. *Catalepsy.* Loss of consciousness with peculiar rigidity of muscles, so that when the body or a limb is placed in any position it becomes fixed.
3. *Eclampsia.* Tonic spasms with loss of consciousness in infants. The acute epilepsy of some writers.

IV.—NEURAL DISORDERS, *in which the nerves are affected during their course or at their extremities.*

1. *Neuralgia.* Pain in the course of a nerve, although in fact all kind of pain whatever is owing to irritation of the nerves. Thus the sympathetic system of nerves and its ganglia, though ordinarily giving rise to no sensation, may occasionally do so, as in *angina pectoris*, *colic*, *irritable testicle, and uterus*, and other agonising sensations, referred to various organs.
2. *Irritation of the nerves of special sense.* Of the optic, causing *flashes of light*, *ocular spectra*, *muscæ volitantes*, etc.; of the auditory, causing *tinnitus aurium;* of the olfactory, causing unusual *sensitiveness to odours;* and of the gustatory, causing *perverted tastes* in the mouth. Itching, formication, and other sensations referable to the peripheral nerves, also belong to this class.

3. *Irritation of special nerves of motion*, as in local spasms of one or more muscles, or of the hollow viscera.
4. *Local Paralysis.* Loss of motion or sensibility in a limited part of the body, or confined to a special sense, as in *lead palsy*, or in *amaurosis*, *cophosis*, *anosmia*, *ageustia*, and *anæsthesia.*

V.—NEURO-SPINAL DISORDERS, *in which both the nerves and spinal cord are affected.*

1. *Diastaltic or reflex actions.* To this class belong all those diseases depending on irritation of the extremity of a sensitive nerve, acting *through* the cord and motor nerves on the muscular system, and producing a variety of spasmodic disorders, local or general, far too numerous to mention,—which can only be understood by a thorough knowledge of the physiology of the diastaltic or excito-motory system of nerves.

Pathology of Functional Nervous Disorders.

By the term functional disorder of the nervous system, I understand one which may produce the greatest pain, spasms, paralysis, and even death, and yet, on the most careful examination afterwards, assisted by the most minute researches with the aid of the microscope, not the slightest change from the normal structure of the nervous tissue can be observed. Such is what occurs in all the disorders we have named, some of them moreover almost always fatal, such as tetanus and hydrophobia. At the same time it must not be forgotten, that similar phenomena may be the result of structural disease of the nervous system. Thus tetanic rigidity may depend on a spinal arachnitis, as well as on the irritation from a wound, or poisoning by strychnine, and delirium and coma may be caused by cerebral meningitis, as well as by moral insanity, starvation, or poisoning by chloroform or opium. Whether in these cases there be in fact only one cause common to the whole, it is difficult to say, certainly it cannot be demonstrated. It might be contended that in every instance there is a certain amount of congestion producing unaccustomed pressure, or that a peculiar state of nutrition of the part is momentarily produced here or there in the nervous mass. But as neither theory appears to us applicable to all cases, we shall consider the pathological causes of functional nervous disorders as of three kinds—1st, Congestive ; 2d, Diastaltic ; 3d, Toxic.

Congestive disorders of the nervous system. I have previously pointed out the peculiar nature of the circulation within the cranium and vertebral canal, and shown that, although well defended under ordinary circumstances against any mischievous change, still when such change does occur it operates in a peculiar manner. (See p. 120, *et seq.*) In other words, so long as the bones are capable of resisting atmospheric pressure, although the amount of fluid within these cavities cannot change as a whole, yet the distribution of that amount may vary infinitely. Thus by its being accumulated sometimes in the arteries, at other times in the veins, or now in one place, and then in another, unaccustomed pressure may be exercised on different parts of the nervous centres. This according to its amount may either irritate or suspend the functions of the parts, a fact proved by direct experiment, as well as by innumerable instances, where depression of bone has caused nervous phenomena, which have disappeared on removal of the exciting cause. That congestion does frequently occur in the brain and spinal cord, there can be no doubt, although it cannot always be demonstrated after death. The tonic contraction of the arteries is alone sufficient to empty them of their contents, and turgidity of the veins may or may not remain according to the symptoms immediately preceding death, and the position in which the body is placed. But it is observable, that every cause which excites or diminishes the action of the heart and general powers of the body, are at the same time those which induce nervous disturbance, as well as occasion a change of circulation in the cerebro-spinal centres—such as the emotions and passions, plethora and anemia, unaccustomed stimuli, uterine derangement, etc. etc.

It is only by this theory that we can understand how such various results occasionally occur from apparently the same cause, and again how what appear to be different causes produce similar effects. Thus violent anger, or an unaccustomed stimulus may, in a healthy person, induce a flushed countenance, increased action of the heart, a bounding pulse, and sudden loss of consciousness. Again, fear or exhaustion may occasion a pallid face, depressed or scarcely perceptible heart's action, feeble pulse, and also loss of consciousness. In the first case, or *coma*, there is an accumulation of blood in the arteries and arterial capillaries, and a corresponding compression of the veins; in the second case, or *syncope*, there is distension of the veins and venous capillaries, with proportionate diminution of the calibre of the arteries. In either case, owing to the peculiarity of the circulation within the cranium, pressure is exerted on the brain. Hence syncope differs from coma only in the extreme feebleness of the heart's action, the cause, producing loss of consciousness, sensation, and voluntary motion, being the same in both. Indeed it is sometimes difficult to distinguish these states from each other, and that they have frequently been confounded does not admit of doubt.

In the same manner, partial congestions from either cause may occur in one hemisphere, or part of a hemisphere, in the brain, or in any particular portion or segment of the spinal cord. The pressure so occasioned may irritate and excite function, or may paralyze or suspend it; nay, it may so operate as to suspend the function of one part of the nervous system, while it exalts that of another. Thus all the phenomena of epilepsy are eminently congestive, the individual frequently enjoying the most perfect health in the intervals of the attack, although the effects are for the time terrible, causing such pressure that, while the cerebral functions are for the time annihilated, the spinal ones are violently excited. In the same manner are explained all the varied phenomena of hysteria and spinal irritation, for inasmuch as the spinal cord furnishes, directly or indirectly, nerves to every organ of the body, so congestion of this or that portion of it may increase, pervert, or diminish the functions of the nerves it gives off, and the organs which they supply. Congestion, therefore, we conceive to be the chief cause of functional nervous disorders originating in the great cerebro-spinal centre.

Diastaltic or Reflex Disorders of the Nervous System.—We have previously seen that recent researches render it probable that the actions hitherto denominated reflex are in fact direct (p. 114), only that the impression which is conveyed commences in the circumference of the body, instead of in the nervous centres. There is every reason to believe that such impressions pass *through* the cord by means of conducting nerve fibres, which cross from one side of that organ to the other, and that histology will yet demonstrate that all these apparently confused actions are dependent on the existence of certain uniform conducting media. Indeed, already we can judge with tolerable exactitude, from the effects, what are the particular nerves and segments of the cord which are inflamed during a variety of actions; and notwithstanding the immense difficulties of the inquiry, we have every hope that the period is not distant when the diagnosis of many more reflex acts will also be rendered certain. The principle involved in all these acts is, that the irritation which produces them is to be sought for in the nervous extremities rather than in lesions of the centres; and the great importance of this principle in pathology and in practice cannot be too highly estimated, although for the numerous details which illustrate it, I must refer to physiological works, and especially to those of Dr. Marshall Hall. I would point to traumatic tetanus, and to the convulsions resulting from teething and gastric derangements in children, as good examples of diastaltic functional disorders.

In addition to important diseases of this kind, numerous symptoms which accompany organic changes belong to the same category. In other words, the structural lesion constitutes the irritant, or cause, while the effect is functional. Thus I have seen epileptic opisthotonos, after resisting for years every kind of remedy, at once removed on extracting a decayed tooth. In the case of Joanna M'Gregor, admitted Dec. 4th 1856, there was hysterical epilepsy, which resisted all treatment, and among the rest, a long-continued use of the bromide of potassium, recently recommended by Sir Charles Locock in such cases. The attacks of universal rigidity, with tremor and complete unconsciousness, usually lasted from three to four hours. It was observed, however, that immediately before coming out of the attack she was seized with suffocative cough, accompanied by great turgidity and redness of the face. It was thought that by exciting such cough artificially, the attacks might be shortened. Galvanism was in consequence applied to the larynx the moment she was seized, with the effect of at once exciting cough, flushing of the face, and immediate recovery. In this case, the spasm of the larynx, which was an excito-motory act, by producing a change in the circulation within the cranium, dispelled the congestion causing the epileptic paroxysm.

Again, those compound effects which require the conjunction of volition with diastaltic acts are most interesting to the scientific practitioner, such for instance as coughing, yawning, laughing, hiccough, and sneezing. Cough more especially is a frequent and most distressing symptom, and, as we shall subsequently see, requires for its successful treatment thorough knowledge of the causes producing it. If, for instance, it originates in irritating disease of the larynx, what permanent benefit can be produced by giving opiates which act upon the brain?

Toxic Disorders of the Nervous System.—The influence exercised by certain drugs is of a kind which causes a close resemblance to various diseases of the nervous system. These influences, if carried to excess, are toxic, and dangerous to life; if employed moderately and with caution, they constitute the basis of our therapeutic knowledge in a vast variety of diseases. Why one drug should possess one power, and another a different one, or why some should influence the brain, and others the spinal cord or nerves, we are ignorant. Such facts are as much ultimate facts in therapeutics as are the separate endowments of contractility and sensibility in physiology. As pathological causes of functional disorders of the nervous system, their power is undoubted. By their means the five classes of nervous disorders may be occasioned in different ways, producing altogether distinct and peculiar effects. Thus—

Cerebral toxic disorders are occasioned by opium and most of the pure narcotics, which first excite and then depress or destroy the mental faculties. According to Flourens, opium acts on the cerebral lobes, while belladonna operates on the corpora quadrigemina. The first causes contraction, and the last dilatation of the pupils. *Tea* and *coffee* are pure excitors of the cerebral functions, and cause sleeplessness. *Alcoholic drinks*, *æther*, *chloroform*, and similar stimulants, first excite and then suspend the mental faculties, like opium. The modern practice of depriving persons of consciousness, in order, for a time, to destroy sensation, has been very much misunderstood, in consequence of such remedies having been erroneously and unscientifically denominated anæsthetics. The fact is, they in no way influence local sensibility, or the sense of touch. Their action is altogether cerebral, and hence the danger which occasionally attends their action.

Spinal Toxic Disorders.—*Strychnine* acts especially as an excitor of the motor filaments of the spinal cord, causing tonic muscular contractions, as in tetanus from spinal arachnitis, or from the diastaltic action of a wound. *Woorari* produces exactly an opposite effect, causing paralysis and resolution of the same parts. *Conium* paralyses the motor and sensitive spinal nerves, producing paraplegia, commencing at the feet and creeping upwards. (See case of Gow, p. 413.) *Picrotoxine*, according to Dr. Mortimer Glover, causes the animal to stagger backwards, as in the experiments of Magendie on the Crura cerebelli.

Cerebro-Spinal Toxic Disorders.—Of these the poisonous effects of hydrocyanic acid offer a good example. All the animals I have seen killed by this agent utter a scream, lose their consciousness, and are convulsed. These are the symptoms of epilepsy. *Cold* is at first an excitor of the spinal functions, and is a strong stimulant to diastaltic activity, but if long continued produces drowsiness and stupor.

Neural and Neuro-Spinal Toxic Disorders are especially occasioned by the action of certain metallic poisons, such as *mercury*, which occasions irregular muscular action with weakness, and *lead*, which causes numbness and palsy, most common in the hands. On the other hand, *cantharides* stimulates the contractions of the neck of the urinary bladder, and *secale cornutum* those of the pregnant uterus. *Stramonium* acts as a sedative to the nerves of the bronchi, while *aconite* operates powerfully in paralysing the action of the heart.

Treatment of Functional Nervous Disorders.

The great principle in the treatment of *congestive* disorders of the nervous system appears to me, the necessity of increasing the strength and nutrition of the body by all practicable means. Such, indeed, has been the general practice, the mineral tonics, and more especially chalybeates, being the chief remedies administered in such cases, conjoined with the various preparations of quinine, bark, and the vegetable bitters. Stimulants of all kinds, and especially the anti-spasmodics, have also been liberally administered. It must be confessed, however, that not unfrequently antiphlogistics, with general and local bleeding, especially the latter, have occasionally been employed. Formerly it was supposed, and I shared in the opinion, that functional nervous disorders might depend upon both an increased and a diminished vital power of the economy, and that for the former, a lowering, and for the latter a supporting plan of treatment would be necessary. Experience, however, has satisfied me, that if the former cause ever operates at all, it is extremely seldom, and that nervous disorder is almost always a symptom of exhaustion.

The relief of pain, more especially in cephalalgia and spinal irritation, appears to follow laws which have by no means been determined. Thus two or three leeches applied over the part often effect this object, under circumstances where it is impossible to imagine that they can have diminished the congestion. How, for instance, in cases of headache, if it be dependent upon congestion of the brain, can an ounce of blood, drawn by leeches from the vessels of the scalp, act in this way? It has often appeared to me, that the warm fomentations usually applied to the leech bites afterwards, is often more effectual than the loss of blood, and that the therapeutic action is really reflex in its character. For the same reason, dry is often as effectual as wet cupping.

The influence of cold and heat is equally difficult to explain, and especially how in some cases a diminished, and in others an elevated temperature causes so much relief. Thus some kinds of cephalalgia and nervous pain are at once alleviated by cold. I know of nothing that produces such immediate ease and comfort, in cases of typhus fever, with headache, as gently pouring cold water over the shaven scalp. In other cases apparently similar, it is warmth which operates. I was summoned to a married lady who, during the day, had experienced several rigors, and found her in the evening with a burning skin, rapid pulse, furred tongue, intense headache, in short, all the symptoms of fever. To alleviate the intolerable headache, I poured cold water over the head, which to my surprise caused no relief whatever. I then immediately changed the cold for hot water, and as if by magic the pain at once disappeared. This led me to suppose that, after all, the case might not be one of fever, although at the time I could obtain no information from the patient to satisfy my doubts. But in a week she aborted, having been unconscious that she was pregnant. The only practical rule I know of on this matter is, if cold fails, to try warmth. Most assuredly as alleviators of local pain they are among the most powerful means possessed by the physician.

As a true anæsthetic, or destroyer of local sensibility, congelation has been shown by Dr. James Arnott to be a most successful and manageable remedy. I have used it in the way he has recommended with excellent effect in a variety of local painful affections, and join him in condemning the use of chloroform in cases where this safer proceeding can be employed. Why remove the consciousness of an individual by deep intoxication, with all its attendant risks, when the same effect can be produced by immersing the parts in a mixture of powdered ice and salt, without any risk at all?

Counter-irritation is also most useful in the relief of chronic congestive nervous disorders, and not unfrequently produces a cure. This is well observed in certain cases of spinal irritation, in which the local pain is often made to shift its position, and if followed by other blisters is at length got rid of. I once ordered a blister to be applied over some painful dorsal vertebræ, in a young lady, who had long suffered from dyspnœa, cough, and supposed phthisis. Next day I found her breathing easily, with no pain in the back, which, however, had shifted to the occiput, and occasioned trismus. Another blister applied to her neck perfected the cure. On other occasions, the disappearance of pain in one part of the back will bring on sudden aphonia, palpitation, colic, or other symptoms, which in their turn yield to further counter-irritation.

The great principle in the treatment of *diastaltic* disorders of the nervous system is to remove the peripheral source of irritation from which they arise. Thus cutting the gums, diminishing acidity in the stomach, or removing undue accumulations in the intestines, are the appropriate means for combating the convulsive disorders of infancy and childhood. Attacks of hydrophobia, epilepsy, and tetanus, may frequently be prevented by attention to the local causes which induce these disorders. Hysteria is always associated with uterine derangement, to which the practitioner's attention should chiefly be directed, whilst innumerable spasms and convulsions may be traced to carious teeth, disease of the larnyx or pharynx, indigestible food, worms, peculiar habits and occupations, etc. etc., on the removal of which the cure depends.

The ready method of applying numerous remedies for the cure of morbid states or particular symptoms is dictated by our knowledge of excito-motory actions, and owes all its importance to the labours of Dr. Marshall Hall. Thus dashing cold water on the face and general surface in syncope, or in the suspended animation of the new born; the irritation of the fauces to excite vomiting; the avoidance of this irritation, by pushing the bolus rapidly into the pharynx when our object is to excite deglutition; and the series of operations lately proposed to recover asphyxiated persons, are all of this character.

The great principle in the treatment of *toxic* disorders of the nervous system is to support and stimulate the strength of the patient, until the action of the poison is exhausted. This subject will be best illustrated by examples:—

CASE XXXVIII.*—*Delirium Tremens—Recovery.*

HISTORY.—Peter Fraser, æt. 56, an engraver—admitted September 22, 1851. He has generally enjoyed good health. For some time his habits have been very intemperate, and he has had much domestic annoyance. A year ago he had an attack of delirium tremens. During the last few weeks he has been drinking considerably, although he says not to excess. Fourteen days ago he began to feel very restless and uneasy while at work, and his sleep during the night became disturbed, but he has had no tremors or spectral illusions of any kind.

SYMPTOMS ON ADMISSION.—He now complains of severe pain in the head, referred principally to the frontal region. No pains in any other part of the body. His hands when put out have a trembling fidgetty motion, but when kept by his side are steady. Tongue is moderately dry, and covered with a whitish fur. Bowels are generally costive, but were open yesterday. Action of the heart hurried, and occasionally irregular; impulse strong. Pulse 96, full and strong. Other functions normal. ℞ *Sol. Mur. Morph.* ℈ij; *Vin. Antimon.* ʒj; *Tinct. Aurantii,* ʒj; *Aquæ* ℥j *ft. Haustus hora somni sumendus.*

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* Reported by Mr. Scott Sanderson, Clinical Clerk.

Progress of the Case.—*September* 23. Notwithstanding the draught, passed a restless night. Bowels not open since admission. Pulse 90, of moderate strength. ℞ *Pulv. Rhæi. et Mag.* ℈j ; *Aq. Menthæ. Pip.* ℥j ; *ft. Haustus statim sumendus. September* 24.—Passed a more quiet night. Bowels open. From this time all tremor in the hands and cephalalgia left him. He was dismissed quite well September 27.

Case XXXIX.*—*Delirium Tremens with Ocular Spectra—Recovery.*

History.—Elizabeth Banks, æt. 34, married—admitted April 7, 1851. She states that a fortnight ago she was suddenly seized with pain in the head, trembling and dizziness, so that she was obliged to be supported. She ascribes the attack to the receipt of unpleasant intelligence. There have been several of these attacks since, during some of which, her husband says, she has been very violent in her attempts to escape from imaginary enemies. She confesses to having for some time been addicted to spirit drinking, and states that up to the time of this illness she has enjoyed good health.

Symptoms on Admission.—She has a healthy but somewhat restless appearance. She answers questions rationally and is quite calm, remembering everything that has occurred, except during the sudden attacks of trembling, etc. She has pain over the whole head ; there is, however, no heat of scalp or suffusion of the eyes. The pupil is natural, and the iris contracts readily. She sees various things before her, especially different kinds of animals running about, which are most numerous and vivid at night. She feels also at times as if persons were making attempts upon her life. For the last three nights she has had no sleep, in consequence of these ocular appearances. Her hands are very unsteady, and the fingers are constantly playing with the bed clothes. Pulse 90, of good strength. Tongue furred, and rather dry. Bowels habitually constipated and unrelieved for three days. Other functions normal. ℞ *Elaterii* gr. ss. ; *Pulv. Gamb.* gr. ij ; *Pot. Bitart.* gr. x ; *ft. Pulvis statim sumendus.* ℞ *Sol. Morphiæ* ʒj ; *Aquæ* ʒvij ; *ft. Haustus hora somni sumendus.*

Progress of the Case.—*April* 8. Has slept tolerably during the night. Is not so restless, and has seen few ocular spectra. The hands and her whole appearance calm. The purgative powder only occasioned one stool. From this time she gradually recovered, and was discharged quite well on the 24th.

Case XL.†—*Delirium Tremens with Convulsion and Coma—Recovery.*

History.—David Seaton, æt. 25, a chimney-sweep—admitted on the evening of September 10, 1849. His friends state that he has been greatly addicted to the use of spirits, and that during the last three months he has had several apoplectic attacks. He has, notwithstanding, continued to indulge in drink ; was this morning extremely violent, and during the afternoon became insensible.

Symptoms on Admission.—On admission the countenance is bloated and flushed, and his short stout figure gives evidence of great strength. He is now comatose, breathes stertorously ; pulse 60, full and strong. *The head to be shaved,* 12 *leeches to be applied, a drop of croton oil to be placed on the back of the tongue with sugar, so as to insure deglutition, and to be repeated in an hour if necessary.*

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* Reported by Mr. W. H. Pearce, Clinical Clerk.

† Reported by Mr. Alexander Christison, Clinical Clerk.

Progress of the Case.—*September* 11.—During the night he several times partially recovered his senses, and again relapsed. To-day is much better, and can answer questions in a confused way. Four drops of croton oil have been given, and operated once. To have ʒj of sol. of morphia at night. *September* 12.—Violent delirium during the night, with insomnolence. It became necessary to employ the straight waistcoat. Pulse quick and feeble. *Ice water to be applied to the head. ʒj of morphia to be repeated at night. To have a turpentine enema. September* 13 and 14.—No improvement. *September* 15.—Is somewhat sensible; pulse rapid and feeble. To discontinue the morphia. To have ℥j of whisky every two hours. *September* 16.—Slept a little last night. To-day talks sensibly. Pulse 80, stronger. Bowels open by means of an injection. From this time he gradually recovered, and was dismissed well September 27.

Case XLI.*—*Coma and Death from Excessive Drinking—Opacity of Arachnoid—Sub-arachnoid Effusion—Fluid Blood.*

History.—James Dick, æt. 48, a joiner—admitted on the evening of January 31, 1851, in a moribund condition. He has been habitually intemperate for many years. For the last week has been in a constant state of intoxication. This evening became suddenly ill, and lost his consciousness. Shortly afterwards he was conveyed to the Infirmary.

Appearance on Admission.—On admission he presented all the appearance of a corpse. No breathing was perceptible; no beating of the heart could be heard with the stethoscope. The countenance pale; head thrown back; mouth open and frothy; eyes turned up, and pupils dilated. All efforts at re-animation were of no avail; he was dead.

Sectio Cadaveris.—Thirty-eight hours after death.

Body well formed and strong, not emaciated. A little tumidity of depending parts.

Head.—On removing the calvarium, the sub-arachnoid tissue was seen to be infiltrated with fluid, raising the arachnoid to the level of the convolutions. The sinuses were distended with fluid blood. The cerebral arachnoid presented considerable opacity all over the hemisphere, in some places diffused, in others exhibiting minute points closely aggregated together. The ventricles contained a small amount of fluid, and several simple cysts in the choroid plexuses. Cerebral arteries and other portions of the brain perfectly healthy.

Chest.—Both pleuræ contained several ounces of serum, and were slightly adherent at the apices. Both lungs were healthy, with the exception of unusual engorgement, posteriorly and inferiorly. A cretaceous concretion, the size of a barley-corn, in apex of right lung. Bronchi contained a moderate quantity of frothy mucus, which was more abundant in trachea and larynx. Pericardium contained one drachm of serum. Heart healthy. The blood in the cavities and large vessels remarkably fluid.

Abdomen.—The liver pale in colour, and very soft, weighed 3 lbs. 14 oz. A few serous cysts in the kidney. Other abdominal organs healthy.

Microscopic Examination.—The cells of the liver were loaded with oil granules of large size. The tubercles of the kidney here and there also contained several fatty granules. Cerebral substance healthy.

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* Reported by Mr. Sanderson, Clinical Clerk.

Commentary.—Various opinions as to the nature of delirium tremens have been held by medical men who have successively placed it among the neuroses, the phlegmasiæ, and the pyrexiæ. Until recently, it was held that whilst drinking was its predisposing cause, the sudden abstraction of the accustomed stimulus brought on the attack. This theory has been very successfully combated by Dr. Peddie,* who has shown that the disease is seldom observed in our prisons, notwithstanding the large number of confirmed drunkards admitted there and immediately placed upon low diet. The view of its pathology now prevalent is, that alcohol, though a poison dangerous to life in large doses, is also cumulative taken habitually in small quantities. Like many others, it is one which especially affects the nervous system, and more particularly the brain, as shown by Percy, Huss, and other writers. Hence those effects denominated intoxication, delirium tremens, etc. Formerly the treatment used to consist of supplying the accustomed stimulus; but now, whilst theoretically it is clear that this is tantamount to adding coals to fire, it has been shown by experience that patients more rapidly recover under the use of antimonials and nutrients. In the vast majority of cases of delirium tremens, the poison becomes eliminated from the system in a certain time; whether antimony in a half or quarter grain doses assists this process is not known. Generally speaking, if a good sleep can be obtained, it is critical, and the patient at once recovers. Opium has been largely given to obtain this result, but it is much to be doubted whether its supposed beneficial action is not dependent on coincidence with the muscular fatigue and exhaustion which at the same time accompanies the elimination of the poison and the tendency to repose. Practically it is of great importance that the windows and doors of the room in which patients with delirium tremens are, should be well closed, because, although there is no violence, a tendency to escape from imaginary enemies has led to some deplorable accidents. Personal restraint should be avoided. Nutrition also should be carefully maintained, as death, when it occurs, is for the most part the result of exhaustion, with serous effusion into the subarachnoid cavity.

CASE XLII.†—*Poisoning by Opium—Recovery.*

HISTORY.—Helen M'Dermott or Cuthbertson, æt. 33, but looking ten years older, residing in the Cowgate as the wife of a cooper, was admitted at 3 P.M. May 25th, 1857. She has not unfrequently been drunk, and had a quarrel lately with her husband. On the preceding day she had gone out and purchased two ounces of laudanum, namely, one ounce at two different druggists' shops, and had swallowed them (it is said) half an hour before admission.

SYMPTOMS ON ADMISSION.—On admission, contracted pupils, great drowsiness, relaxation of muscles, and tendency to cold; with lividity of face and extremities.

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* Monthly Journal of Med. Science. June, 1854.

† Reported by Dr. John Glen, Resident Physician.

The stomach-pump was employed to wash out the stomach; this was first done with warm water, and twice subsequently with mustard and water. The first vomited matters smelled of laudanum. The patient was stimulated to walk about until toward 4.30 P.M. By that time her limbs became so relaxed that she sank to the ground; and she was so drowsy as to fall asleep unless pushed or pricked. The galvanic battery was then applied to the popliteal spaces, and to the hands, breast, and neck — (Kemp's battery being the instrument employed). Meanwhile, as patient was in bed, warmth was maintained by clothes and hot bottles. Under stimulus of the battery, patient was also induced to swallow some coffee. At 6.30 P.M. she was so easily roused by galvanism—the skin warm, the pulse (small and weak before) becoming more perceptible and strong — that the stimulus was more rarely applied, merely to prevent the sleep into which from time to time she fell from becoming profound. At 8 P.M. a drachm of brandy, and half a drachm of Sp. Ammon. Aromat. were administered, to be repeated every hour. During the first three administrations of this stimulant vomiting occurred, the vomited matter consisting of the coffee that had previously been swallowed. At ten, eleven, and twelve she was seen dozing slightly, but was easily roused. Next morning complained of sickness, and of not having been able to sleep during the night; was quite conscious and thankful for her recovery. Slept during the day, taking tea and beef-tea. On the 27th, having fully recovered, she was discharged.

Commentary.—The symptoms of poisoning by opium in man are altogether cerebral, the danger to be apprehended being a fatal stupor. To prevent this, the practice successfully carried out in the above case is the one now generally considered best. The dose of the poison taken was large, but fortunately the time after its administration was not great.

CASE XLIII.—*Poisoning by Hemlock—Death.*

HISTORY.—On Monday, April 21st, 1845, about seven o'clock in the evening, a man, called Duncan Gow, was brought into the Infirmary by two policemen. It was stated that he had been found lying in the street, apparently in a state of intoxication, or in a fit. On being taken into the waiting-room, he was found to be dead.

I subsequently learnt from his wife that the man, forty-three years of age, a tailor by trade, was in such reduced circumstances that he had not eaten anything on Monday, until he took the substance which caused his death. Two of his children, a boy and girl, aged respectively ten and six years of age, found what they took for parsley growing on the bank under Sir Walter Scott's Monument (which was then building), and knowing that their father was very fond of this, as well as other green vegetables, they gathered some to take to him. On visiting the place with the boy, four days afterwards, I found that the spot from whence the plants were gathered had been covered over with fresh rubbish. But on the uncovered part of the bank, eighty yards westward, the *Conium maculatum* could be seen growing in considerable quantity. The children returned home between three and four o'clock P.M. The father, who had fasted the whole day, greedily ate the vegetables, together with a piece of bread, and said more than once how good they were. The quantity consumed could not be ascertained, for he ate nearly all that was brought. On finishing his meal, he rose, saying he would endeavour to get some money, in order to procure food for his children. At this time he was in perfect health.

From his own house, at the head of the Canongate, Gow walked about half a mile to the house of one Wright, in the West Port, with a view of selling him some small matter. Wright, on his entering the room, thought at first that he was intoxicated, because he staggered in walking. On passing through the door also, which was narrow, he faltered in his gait, and afterwards sat down hastily. He stayed ten minutes, during which time he conversed readily, drove a hard bargain, and obtained fourpence for what he sold. He did not complain of pain or uneasiness, was not excited in manner or speech, and his face was pale and wan. On rising from his chair, he was observed by Wright's boy to fall back again, as if he had some difficulty in rising. On making a second effort he got up, and was seen by Wright's wife to stagger out of the house and down the steps. This was a little after four o'clock.

On leaving Wright's house, he was next seen standing with his back against the corner of the street, by Andrew Mc'All, a meal-dealer in the Grassmarket, about 200 yards from Wright's house. Mc'All saw him leave the corner he was leaning against, and stagger to a lamp-post a few yards further on. Here he again paused for a few minutes, and then again went forward in the same vacillating manner, passed Mc'All's shop, and sat down at the opening of the common stair next to it. Mc'All's words are, "He could not walk rightly, and was staggering as a man in liquor." His mode of progression attracted a number of boys and girls, who laughed at him, believing him to be intoxicated. He was heard to speak to them, but what he said is not known. He was also seen by two women, who told a policeman to take him away.

The policeman (James Mitchell, No. 161) told me, that, on finding Gow sitting at the foot of the common stair, he thought he was drunk. He spoke to him, and in reply Gow desired to be taken to his own house, at the top of the Canongate. He also said that he had completely lost his sight, and had not the perfect use of his limbs, but expressed his willingness to walk forwards, until the policeman could obtain the assistance of his comrade in the Cowgate. He was then raised up and supported by one arm, but, after moving with great difficulty past four or five shops, his legs bent under him, and he fell upon his knees. Mitchell then gave him some water to drink, which he was incapable of swallowing, and left him to get a barrow. On his return he found him surrounded by women, who were pouring cold water on his head, and sprinkling his forehead. With the assistance of another policeman (James Hastie, No. 111), he was then placed on the barrow. One of the women, Mrs. Anderson, on his being raised, saw that he made no attempt to walk, but that, as he was pulled away by the policemen, his legs were dragged or trailed after him.

The second policeman, Hastie, on first seeing him, told Mitchell that it was not drink, but a fit, that was the matter with him. He lifted up his eyelids and found the eyes dull. He seemed sensible, and endeavoured to say something, but could not articulate. He was now slowly conveyed to the main police-office in the High Street, where he arrived about six o'clock. Mitchell told the police lieutenant on duty that, from the manner in which the man was lying, and from the loss of power in the legs, he now thought he was *not* intoxicated. At this period it would seem that, although the limbs were completely paralysed, the intelligence was still perfect, for he told the turnkey his exact address in the Canongate, in reply to a question.

Dr. Tait, surgeon to the police force, was now sent for, and saw him about a quarter past six. In reply to a note which I addressed to him on this subject, he says:—

"The first impression produced on my mind from his appearance was, that he was in a state of intoxication; he was then lying on his back, with his head and shoulders elevated upon a board we have in the office for that purpose. He was sensible when I spoke to him, and tried to turn his face towards me, and slightly raised his eyelids, but appeared unable to speak. His power of motion appeared completely prostrated, for when I lifted his arm, and laid it down, it lay where it was put; and when his arm-pits were tickled he seemed to manifest a little sensibility, but could make no exertion to rid himself of the annoyance. There were occasional movements of the left leg, but they appeared rather to be spasmodic than voluntary. Several efforts were made to vomit, but these were ineffectual. His pulse and breathing were perfectly natural. He had spoken to the turnkey a few minutes before I arrived. Heat of skin natural. I visited him again, about ten minutes before seven o'clock, at which time all motion of the chest appeared to have ceased; the action of the heart was very feeble, and the countenance had a cadaveric expression; pupils fixed. He was then sent to the Infirmary."

He was conveyed to the Infirmary by Hastie and another policeman, M'Pherson. After being put on the stretcher, Hastie saw him draw the legs gently upwards, as if to prevent their hanging over the iron at its extremity. This was the last movement he was seen to make. On being carried into the waiting-room of the Infirmary, he was visited by the house-clerk on duty, who found him pulseless, and declared him, as previously stated, to be dead. This was shortly after seven o'clock P.M.

Sectio Cadaveris.—Sixty-three hours after death.

The body was well formed and muscular. There were no external marks of violence. The back and depending portions were livid from sugillation.

HEAD.—An unusual quantity of fluid blood flowed from the scalp and longitudinal sinus when divided. There was slight serous effusion below the arachnoid membrane, and about two drachms of clear serum in the lateral ventricles. The substance of the brain was soft throughout; on section presented numerous bloody points, but was otherwise healthy. No fracture could be discovered in any part of the cranium.

CHEST.—There were slight adhesions between the pleuræ on both sides superiorly. The apices of both lungs were strongly puckered. On the right side below the puckering, were two cretaceous concretions, the size of peas, surrounded by chronic pneumonia and pigmentary deposit. On the left side only induration, with hard, black, gritty particles, existed below the puckering. The structure of the lungs otherwise was healthy, although they were throughout intensely engorged with dark-red fluid blood. The heart was healthy in structure, but soft and flabby. The blood in the cavities was mostly fluid, presenting only here and there a few small grumous clots.

ABDOMEN.—The liver was healthy; the spleen soft, readily breaking down under the fingers. The kidneys were of a brownish-red colour throughout, owing to venous congestion, but healthy in structure. The stomach contained a pultaceous mass, formed of some raw green vegetable resembling parsley. Its contents weighed eleven ounces, and had an acid and slight spirituous odour. The mucous coat was much congested, especially at its cardiac extremity. Here there were numerous extravasations of dark-red blood, below the epithelium, over a space about the size of the hand. The intestines were healthy, here and there presenting patches of congestion in the mucous coat. The bladder was healthy; its inner surface much congested from venous obstruction.

THE BLOOD throughout the body was of a dark colour and fluid, even in the heart and large vessels.

Commentary.—From the absence of structural lesion, and the general fluidity of the blood, I was induced to suspect that the vegetable matter found in the stomach was of a poisonous nature. On examining this more minutely, it was seen to be composed chiefly of fragments of green leaves and leaf-stalks. Although much was reduced to a pulp, a considerable quantity of both had escaped the action of the teeth. The same afternoon I carried as perfect a specimen of the fragments as could be found to Dr. Christison, who pointed out that they could scarcely be anything else than the *laciniæ* of the *Conium maculatum*, or common hemlock. Next day I bruised some of the leaves in a mortar, with a solution of potash, when the peculiar mousy odour of conia was evolved so strongly that Dr. Douglas Maclagan and others, although previously unacquainted with its nature, at once pronounced it to be hemlock. Dr. Christison also procured a recent specimen of the *Conium maculatum* from Salisbury Crags, the botanical characters of which, on being compared with the fragments found in the stomach, were proved to be identical. No doubt could exist, therefore, that the man died from having eaten hemlock.

Few cases of poisoning with this plant have hitherto been published, and none have been minutely detailed. The effects imputed to it in the notices given of prior cases are very contradictory. In some it is said to have caused death, like opium, by stupor and coma. In others, convulsions of the frantic kind are symptoms stated to have been present. But the effects observed by Dr. Christison in the lower animals, in his experiments with extract of hemlock and its alkaloid conia, are totally different,—viz., "palsy, first of the voluntary muscles, next of the chest, lastly of the diaphragm; asphyxia, in short, from paralysis, without insensibility, and with slight occasional twitches only of the limbs."* On this account, as well as from the circumstance that considerable interest is connected with the question, as to whether the hemlock of modern times be the Κώνειον, or state poison of the Athenians, great pains were taken to obtain a perfect history of the case. In preparing it I endeavoured to insure accuracy, by carefully interrogating all who saw him from the time of his eating the hemlock until the period when he was brought into the Infirmary. Fortunately he was seen by many persons, and their several accounts are on the whole consistent, and render the case tolerably perfect.

The time of day mentioned by the different narrators shows that the poison, shortly after it was taken, produced want of power in the inferior extremities, without causing any pain. This is proved by what took place in Wright's house. His gait, which at that time was faltering, afterwards became vacillating; he staggered as one drunk—at length his limbs refused to support him, and he fell. On being raised, his legs dragged after him; and lastly, when the arms were lifted, they fell like inert masses, and remained immovable. Perfect paralysis of the inferior extremities was ascertained to exist one hour and a half after the poison was taken, and that of the arms half an hour later.

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* Treatise on Poisons, p. 855, 1845.

As regards the existence of sensibility, we have only the evidence afforded by tickling the arm-pits, which, according to Dr. Tait, seemed to excite it a little. The amaurosis, however, is a proof that one nerve of sensibility at all events was paralysed. This seems to have happened when perfect paralysis of the inferior extremities was manifested.

The excito-motory functions seemed also paralysed. Tickling the arm-pits failed in producing movements. He lost the power of deglutition. Dr. Tait says his efforts to vomit were ineffectual. There were no convulsions, only slight occasional movements of the left leg; and lastly, both inferior extremities were slowly drawn upwards, when placed over the iron of the stretcher. Three hours after taking the poison the respiratory movements had ceased; the pupils were fixed. At this time the heart's action was felt very feeble. These also ceased about ten minutes afterwards.

The intelligence remained perfect up to a very late period. When his movements were vacillating he was seen to direct his steps from one fixed point to another. After paralysis of the inferior extremities was fully developed, he gave accurate directions how he was to be taken home, and described his principal symptoms. Two hours after taking the hemlock, when brought into the police-office, although he could not swallow, he gave his address; and a quarter of an hour afterwards, when seen by Dr. Tait, though he could not speak, he appeared sensible, and tried to turn his face towards him.

Death took place about three hours and a quarter after eating the poison, and was evidently occasioned by gradual asphyxia from paralysis of the muscles of respiration. The appearances observed in the mucous membrane of the stomach were most probably caused by the unusual fluidity of the blood, and this in its turn by the gradual asphyxia.

The phenomena, therefore, observed in this case fully corroborate the physiological action of hemlock, as described by Dr. Christison, from his experiments on animals.* It evidently acts upon the spinal cord, producing directly opposite effects to those occasioned by strychnia. Paralysis of the voluntary muscles, creeping from below upwards, is the characteristic symptom, unaccompanied by pains or derangement of the intellectual faculties. Some authors have described delirium and frenzy, and others giddiness and convulsions, to have been occasioned. But such symptoms were not observed in the case of Gow, nor in the experiments on the lower animals by Dr. Christison. Indeed, the symptoms described by Plato in the case of Socrates, resemble as nearly as possible those which appeared in Gow. We are told that Socrates was directed by the executioner to walk about after swallowing the poison, until his limbs should grow heavy. He did so, and then lay down. On his feet and legs being squeezed, they were found insensible; they were also pointed out by the executioner to be cold and stiff. When paralysis had proceeded upwards to the abdomen, Socrates made a request to Crito, proving that his intellect was then unaffected. In a short time after he became convulsed, his eyes were fixed, and he died. Whether stiffness was present in Gow's case was not ascertained. The nature of the convulsions, whether violent or otherwise, is not stated in the account by Plato, but slight spasms were observed in Gow.

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* Transactions of the Royal Society of Edinburgh, vol. xiii.

It will be observed that when Socrates felt paralysis coming on he lay down. Hence the staggering and falling in the street, observed in Gow, did not take place. The description of the effects of the Κώνειον, given by Nicander, however, would in this case apply with great accuracy. He says (I quote from Dr. Christison's paper):—"This potion carries destruction to the powers of the mind, bringing shady darkness, and makes the eyes roll. But staggering on their footsteps and tripping on the streets, they creep on their hands. Mortal stifling seizes the upper part of the neck, and obstructs the narrow passage of the throat. The extremities grow cold, the strong vessels in the limbs contract, he ceases to draw in the thin air, like one fainting, and the soul visits Pluto." If we abstract the poetical parts of the description, and remember the loss of sight, staggering and tripping in the street, the difficulty of deglutition, and place the loss of the intellectual faculties last, this account of Nicander agrees very well with what was observed in Gow.

A difference of opinion exists as to whether the *Conium maculatum* of modern botanists be the Κώνειον of the ancient Greeks. Into the botanical controversy I do not feel myself qualified to enter. But if the symptoms ascertained to have existed in the case I have related be compared with the accounts of Plato and Nicander, I cannot help thinking that it will be found to favour the opinion of those who believe in their identity.

CASE XLIV.*—*Poisoning with Lead—Painter's Colic—Lead Paralysis—Partial Recovery.*

HISTORY.—Peter Taylor, æt. 50, a brewer's servant, admitted September 26th 1851. His occupation in the brewery is to take charge of the steam-engine. He frequently uses half a hundred weight of white lead at a time, for jointing pipes, and is in the habit of painting with the same material. Twelve months ago had a severe attack of Colica Pictonum, from which he slowly recovered under medical treatment, and then resumed his work, being always subject, however, to transient twinges of pain in the bowels, as well as in the joints, which latter he attributed to rheumatism. Six weeks ago he first experienced debility and want of power in both hands, which has gradually increased since. His speech also has become slightly affected.

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* Reported by Mr. Scott Sanderson, Clinical Clerk.

Symptoms on Admission.—He has at present no pain anywhere, and only complains of want of power in both wrist joints. Both hands drop down from the arms, the right especially forming a right angle with the fore-arm. When elevated by another he can flex them voluntarily, but cannot raise them himself, or extend the metacarpal bones, although when these latter are supported by the hand, he can extend the last joints of the fingers. He has perfect command of the shoulder and elbow joints. His grasp of an object is little impaired; there is no wasting of the exterior muscles of the arm, though they feel soft, and sensibility in the paralysed parts is normal. Bowels still somewhat constipated, but were opened freely yesterday. Speaks with unusual slowness, which he thinks has increased lately. All the other functions are healthy.

Progress of the Case.—*October* 1*st*.—Since admission *the bowels have been kept open daily, by small doses of the sulphate of magnesia. The arms have been put up in splints, keeping the wrist and hand extended straight out. Galvanism has been applied twice daily for several minutes in the course of the extensors, and frictions over them are occasionally employed in the interval by means of flannel cloths. Oct.* 15*th*.—He was ordered ℞ *Potass. Hydriod.* ʒss; *Aquæ Cinnam.; Aquæ font.* āā ℥iij. M. *Sumat* ℥j *ter indies.* To-day the splint was removed from the left arm, which still droops, but is more readily extended. *Oct.* 30*th*.—Has complained of numbness in the right arm, attributed to the bandage. The splint was, therefore, to-day taken off, but the hand droops as much as ever, although he can move the metacarpal joints and fingers a little better. *Nov.* 10*th*.—There is decided improvement in the power of motion in both wrist joints, especially the left. ℞ *Extract. Nucis Vomicæ*, gr. vj; *Conf. Rosar. q. s. ut fiant pil.* vj. *Sumat unam ter indies. Nov.* 21*st*.—The pills appear to cause occasional pain in the stomach and bowels, but have occasioned no spasmodic twitches in the muscles generally. The joints have not improved since last report, but he insisted on going out. He was therefore dismissed, with the advice *to exercise the wrists in pumping water*.

Commentary.—Lead, as a poison, appears to act first on the peripheral nerves of the body, and subsequently on the nervous centres, its chief manifestations being in the nerves of the intestines, causing colic, and those of the arms producing paralysis. Why this substance should especially affect these parts, is as much unknown as that any other poison should exert a special influence on particular portions of the nervous system. It has been recently pointed out that the metal exists in the tissues (in the form of carbonate) and sulphur consequently has been recommended internally and externally, with a view of causing its more rapid decomposition and elimination as a sulphuret. For this purpose the sulphurous mineral waters have been recommended. Common alum was given by Gendrin, and an acidulated drink made with sulphuric acid by others. Theoretically, this treatment has its difficulties; for supposing the lead to be converted into a sulphuret, how is this in its turn to be removed from the tissues, any more than the carbonate, without being first rendered soluble, and therefore poisonous? On the other hand, some physicians in France who have tried the chemical treatment extensively, and among others Andral, Sandras, Piorry, and Grisolle, assert that it has no influence whatever, and that patients abandoned to themselves get well just as soon. In most cases the disease yields to time and slow elimination of the poison from the economy. Iodide of potassium also is said by Melsens to have decomposing and eliminating powers. The latter was employed in the above case, but with no great success.

Dr. Christison informs me, that "long ago, when there was a white lead manufactory at Portobello, I used constantly to have in the Infirmary a case or two of lead colic or lead palsy and neuralgia. Every case of colic I saw got speedily well by the alternate use of opium and aperients, and every case of paralysis by generous living, stomachic tonics, warm baths, and especially support and regulated exercise of the arms. One man I well remember, who was three times under my care, in consequence of his always returning to the factory—had colic, palsy, and also neuralgia; but he got well in no long time by attention to the above means."

M. Duchenne has pointed out the great advantage of applying galvanism not generally to the arm, but more especially to the muscles affected, which in these cases are most commonly the extensores digitorum, and not the lumbricales nor interossei—hence why the first phalanges only cannot be extended, whilst when these are supported, the second and third phalanges can be voluntarily raised without difficulty.*

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* For a case of Poisoning by Aconite see Aneurism, case of Henry Smith.

SECTION V.

DISEASES OF THE DIGESTIVE SYSTEM.

Under this head I include derangements of all those parts concerned in the primary digestion—that is, not only the different portions of the alimentary canal properly so called, but the liver, pancreas, and peritoneum. The lesions of the spleen I shall consider in the section devoted to diseases of the blood, as there can be little doubt that this, with the mesenteric and other ductless glands, are not only concerned in the formation, but are most commonly disordered during the unhealthy states of that fluid.

DISEASES OF THE MOUTH, PHARYNX, AND ŒSOPHAGUS.

Case XLV.*—*Tonsillitis.*

History.—Christina Slater, æt. 22, a well-nourished servant girl—admitted May 6th, 1857. Three weeks ago, after exposure to cold, during the family washing she experienced rigors, headache, and thirst, with a sense of dryness and swelling in the throat, especially on the right side; could with difficulty swallow either solids or fluids, the latter occasionally regurgitating through the nostrils. These symptoms continued to increase till the night before admission, when she felt something give way in her throat. She spat up some matter, and thereafter felt general relief.

Symptoms on Admission.—Pulse of moderate strength and frequency; no cardiac hypertrophy nor abnormal murmurs. Respirations easy and not hurried, The voice is soft and natural, but articulation is indistinct and hissing. The jaws are so immovable as to be separable only to the extent of a quarter inch; neither by the finger therefore, nor by inspection, can the tonsils be examined; but there is tenderness on pressure, and considerable fulness in the right sub-parotidean and sub-maxillary regions. The tongue, as far as can be exposed, is covered centrally with a thick white creamy coat; the edges being of a bright red colour. Can now swallow fluids; appetite returning; bowels regular. The urine is non-albuminous, slightly hyperphosphatic, with a mucous sediment. The other functions are normal.

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* Reported by Mr. W. Guy, Clinical Clerk.

Progress of the Case.—Poultices were applied from time to time; on *May 11th*, she was able to open her mouth to the full extent. Both tonsils were then seen to be enlarged, the one on the right side being the size of a walnut. Anteriorly it presented two or three ulcers, with dense yellow margins, about the size of split peas—Lunar caustic being applied to the ulcers. Is now using an astringent gargle. The right tonsil still continuing enlarged, was scarified *May 21st*, with marked relief, and diminished slightly in size afterwards, under the action of tincture of iodine applied locally. The diminution being very slow, and patient otherwise in good health, she was sent, *June 8th*, to Mr. Syme, who excised one half of the gland. *June 10th.*—Was dismissed cured.

Commentary.—Hypertrophy of the tonsils is so common in young children as scarcely to demand notice, unless suspicions of croup are entertained, when they should invariably be examined. I have frequently seen the fauces almost closed from the contact of enlarged tonsils, so as to cause croup-like breathing, and give rise to great alarm. Painting them with the tincture of iodine is the best remedy, and incision may be practised if much permanent inconvenience be occasioned. In the above case, all the three lesions which affect the tonsil were produced, namely, abscess, ulceration, and enlargement. The former burst, the two latter were treated successfully by local applications of the solid nitrate of silver, and subsequently half the gland was excised.

Case XLVI.*—*Follicular Pharyngitis.*

History.—Peter M'Donald, æt. 42, a hammerman in an engine foundry—admitted December 1st, 1856. Four months ago, being previously healthy, he was attacked with severe sore throat, difficulty of deglutition, and subsequently deafness in the left ear. He could not swallow sufficient food, became weak, and in a fortnight gave up work. He ascribes his attack to the sudden changes of temperature to which he was exposed. The dysphagia did not continue, but he still is weak, feels a dryness in the throat, with frequent desire to swallow his saliva, but great difficulty in so doing.

Symptoms on Admission.—The voice is hoarse. On examination with a spatula, numerous red bodies, of a somewhat spherical shape, about the size of a large pin's head, are seen scattered over the mucous membrane of palate, fauces, and pharynx. The mucous membrane of the fauces and pharnyx is of a deep red colour; no ulcers visible; no cough; no expectoration. Digestive, respiratory, and other systems are normal.

Progress of the Case.—Under local application to the pharynx of the nitrate of silver solution (ʒss *of crystallized nitrate* to ℥j *of distilled water*) with a sponge, the sense of dryness and the difficulty of swallowing saliva were relieved; his strength improved under good diet, and he was dismissed Dec. 29th.

Commentary.—Pharyngitis is generally indicated by a high degree of redness with thickening of the mucous membrane; and in certain specific forms of it, ulceration is likely to occur. For a knowledge of follicular pharyngitis, and its importance in relation to diseases of the larynx, we are indebted to Dr. Horace Green of New York. There can be no doubt that many cases of chronic cough, generally denominated bronchitis, chronic laryngitis, or clergyman's sore throat, are dependent on this lesion, and as little that they are to be cured or greatly alleviated by appropriate applications made to the part. For an account of these, however, I must refer to what is said under the head of Laryngitis.

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* Reported by Mr. Alexander Turnbull, Clinical Clerk.

CASE XLVII.*—*Stricture of the Œsophagus from Epithelioma.*

HISTORY.—William Porter, æt. 68, a brassfounder—admitted May 2d, 1855. Two years ago a cab ran over his abdomen, across the epigastric region. He vomited a considerable quantity of blood for a few days after, and felt a pain in the back. From the pain then felt he soon recovered, and enjoyed ordinary health till four months before admission. He then for the first time experienced a sense of obstruction to the passage of food at the lower part of the gullet. The dysphagia has gradually increased, and has latterly been attended with pain. He has had no cough, and no hæmoptysis.

SYMPTOMS ON ADMISSION.—Skin dry, patient greatly emaciated; pulse 68 per minute, weak and irregular; the tongue is covered with white fur. The fauces are natural; his food consists of bread or biscuit, steeped in tea, milk, or water; he does not dare to swallow more solid food. That which he takes (in the presence of the clerk) is returned within one or two minutes. The patient believes that the food vomited has not entered the stomach; being asked to point to the spot where he feels it stop, he puts his finger on the sternum, at the level of the fifth costal cartilage. He feels pain when the food reaches this spot. Three weeks ago, for a fortnight, the pain was felt constantly, even when no food was being taken. The smaller portion of food, which passes the obstruction and enters the stomach, is retained with only slight uneasy sensations. There is no tumour to be detected in the epigastrium; the hepatic organ is normal in size; the abdominal walls are easily excited to rigidity. The bowels are costive; no blood has ever been passed by stool. Nervous and other systems normal. *Nutrients to be taken in small quantities at a time in a liquid form often repeated.*

PROGRESS OF THE CASE.—*May 4th.*—Tongue clean; pulse 68, stronger than on admission. Vomiting appears to be longer delayed. *May 8th.*—A probang passed readily along the œsophagus to-day; there is less uneasiness, but no greater power in swallowing. *May 9th.*—Complains of extreme weakness; asks for beer, which is granted. *May 10th.*—About 2 P.M., while taking a mouthful of beer, he suddenly fell back; the mouth open; the neck stiff; the pupils slightly contracted; the eyes turned upwards; incoherent muttering, without consciousness. His face was pale; he lay gasping for breath; there was a tracheal râle, and a fremitus was felt over the whole chest. An ineffectual attempt to vomit was followed by increased distress. He rapidly sank, and finally expired at ten minutes to three o'clock.

Sectio Cadaveris.—Twenty-two hours after death.

CHEST.—There was a little recent soft yellowish lymph over the pleura, covering the lower part of the left lung. The subjacent pulmonary tissue felt firm, was of a dark colour, and presented a granular section; it was also friable, and portions of it sank in water. About two inches above the cardiac extremity of the œsophagus there was found an epithelial ulcer, nearly encircling the tube. On slitting it up, this ulcer was seen to be of a circular form, an inch and a half in diameter. Its surface was raised about one-eighth of an inch above the level of the mucous membrane, and presented the appearance of a pultaceous mass, of a dirty white matter, resembling gruel. On scraping a portion of it, its base was seen to be composed of a whitish, curdy matter, easily breaking down when pressed between the fingers. The muscular coat below, and mingled with the ulcer, was much thickened, so as, with the ulcer, to produce a stricture of the tube, through which, however, the forefinger could be readily passed. Above the stricture the œsophagus was dilated into a pouch the size of an orange.

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* Reported by Mr. G. M. Reid, Clinical Clerk.

All the other organs were healthy.

Microscopic Examination.—The ulcer presented the usual structure of epithelioma, as described and figured pp. 186, 187.

Case XLVIII.*—*Epitheliomatous Ulceration of the Œsophagus, communicating with the Lung—Pneumonia terminating in Gangrene.*

History.—John Fraser, æt. 55, a flesher—admitted September 19th, 1855. States that, for five or six years previous to admission, his health had been excellent; and that he took his food without any sense of uneasiness, until three or four weeks ago. He then for the first time felt as if a ball of wind rose from his stomach to meet the food, and the food in its passage also gave him pain. The pain was gnawing and paroxysmal. During the last eleven days he has brought up his food after abortive attempts to swallow it, and for four days he has lived on gruel, not being able to swallow any solids.

Symptoms on Admission. — Tongue covered with white fur; fauces natural; appetite reported to be good; thirst not great; food consists of gruel or bread and biscuit soaked in fluid. Says that the food in passing down into his stomach gives him great pain opposite a point half an inch above the lower end of ensiform cartilage; it is returned from the stomach in a few minutes, again causing him pain at the same spot. He adheres constantly to this declaration. Has no nausea; never vomited blood or dark coloured matter. Abdomen is everywhere tympanitic. No tumour can be detected. Dulness of the liver normal. The bowels are very rarely opened. The pulse is 82, rather small and weak. Respiratory and other systems are normal. *To have nutritive diet in a fluid form, in small quantities often repeated.*

Progress of the Case.—From September 22d to October 2d. Has been taking thrice daily the following powders :—℞ *Bismuthi Trisnitrat* ʒj; *Pulv. opii*, gr. ij, *M. et divide in pulveres duodecem.* The dysphagia continues unrelieved; the pain over ensiform cartilage is felt as formerly; and there has been also a sharp internal pain over the mammary regions. *October* 11*th.*—Describes a pain, as if his flesh were being torn away, passing from the lower dorsal vertebræ to the epigastrium. Experienced temporary and partial relief from *a blister applied to the epigastrium. Oct.* 16*th.—Ordered three ounces of sherry wine daily, and scruple doses of the hyposulphite of soda. Nov.* 8*th.* — No diminution in the pain, dysphagia, or vomiting. *Ordered one drop of Fleming's tincture of aconite thrice daily. Nov.* 13*th.*—Vomiting, pain, and weakness continue. The aconite is discontinued, and *naphtha medicinalis in ten-drop doses, with compound tinct. of cardamoms is sub-*

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* Reported by Messrs. G. M. Reid and R. P. Ritchie, Clinical Clerks.

stituted. On the 26th Nov. this mixture was also stopped, and ice was ordered. *Dec. 7th.*—Strong beef-tea injections per rectum are now ordered night and morning. *Dec. 16th.*—To-day vomited round masses looking like blood, and, under microscope, blood corpuscles are recognised in them. *Dec. 23d.*—Blood corpuscles are found in the vomited matters to-day. Pulse small, weak, 120 per minute. *Dec. 28th.*—Has had hiccup for a few days past; pulse 100, very feeble, sometimes intermitting. Thirst, which he did not feel on admission, has lately been urgent. *Jan. 4th.*—Has slight pain over right hypochondrium; increased on pressure; fine moist râles are audible over base of right lung posteriorly, with inspiration. The urine is not coagulable, but is deficient in chlorides. *Jan. 5th.*—Deficiency of chlorides confirmed to-day. Dulness, increased vocal resonance, and crepitation with inspiration, are detected over lower two-thirds of right lung posteriorly. Pulse weak, small, and scarcely perceptible. *To have* ℥ij *of wine additional. Jan. 7th.*—Same signs as in last report. Chlorides are more abundant. Weakness extreme. *Jan. 8th.*—Chlorides again decreased; the pulse is imperceptible; the skin cold; in the evening vomited three ounces of bright red blood. He died almost immediately afterwards at 9 P.M.

Sectio Cadaveris.—Sixty-two hours after death.

The body was much emaciated.

THROAT.—The larynx, pharynx, and cervical portion of œsophagus were natural.

THORAX.—The heart was natural. There were a few adhesions in the left pleura, but the lung was healthy. On the right side of the chest there were firm adhesions superiorly, and on the external lateral aspect. In attempting to remove the lung, a fungating growth situated over the spinal column was broken into. This growth (connected with the œsophagus) was found to have involved a portion of the tissue of the right lung near its root. On removal of the œsophagus, it was seen that a portion of it, about three inches in length, commencing a little above the root of the lung, and going down to about an inch above the diaphragm, was converted into a fungating substance of soft cheesy consistence. A part of the anterior wall of the œsophagus had been broken down and removed in taking out the right lung; the whole of the internal aspect of the affected portion of the œsophagus presented a fungating ulcerated surface. The calibre of the tube must in consequence have been much diminished. The lower end of the œsophagus, as well as the stomach and pylorus, were natural. In the stomach there were three ounces of a brownish fluid resembling coffee grounds.

On removing and cutting into the right lung, a cavity about the size of a walnut was found in its posterior part, a little above the root of the lung. This cavity was filled with a brown fœtid fluid, and the surrounding pulmonary tissue was softened, hepatised, and broken down. Higher up were two smaller cavities, presenting similar characters, and surrounded by a layer of condensed pneumonic substance.

The abdominal organs were natural.

MICROSCOPIC EXAMINATION.—The fungating mass presented all the usual appearance of epithelioma, containing imbedded in the deeper friable portion of the growth, numerous masses of concentrically arranged cells, such as are represented Fig. 204, p. 186.

Commentary.—Epithelioma of the œsophagus was present in the two cases above recorded in different degrees. In Case XLVII., the disease was limited to a patch about one and a-half inch in diameter, causing at that point a stricture of the tube, and immediately above it a considerable dilatation. From the impossibility of taking nourishment, extreme debility was induced, of which he died. In Case XLVIII., the epithelioma was more extensive, surrounding the œsophagus internally over a space three inches in depth, causing great thickening of the tube extending through all the coat, and even affecting the root of the right lung. The whole of the involved tissues were of the consistence of soft cheese, and here and there pulpy and even diffluent. It was evident that at length a communication was formed between the œsophagus and the lung, the occurrence of which was indicated by the existence of a pneumonia occasioning all the physical signs and general symptoms characteristic of that lesion.

CASE XLIX.*—*Carcinomatous Stricture of Œsophagus—Cancer of the Liver —Pulmonary Emphysema and Tubercle—Pneumonia.*

HISTORY.—John Currie, æt. 53, a cooper—admitted February 18th 1857. Was accustomed to drink heavily till within the last half year. Was well fed, strong, and healthy. Has had rheumatic fever thrice, the last time being twelve years ago, without any cardiac symptoms which he can remember. Had inflammation of the chest eighteen years ago. Had general dropsy nine months ago; entered the hospital, and was discharged cured in three weeks. It is about six months ago since the patient first experienced pain in the epigastrium after taking food, with pyrosis and anorexia. For three months he continued in this state, losing flesh and becoming weaker. Three months ago he began to vomit his food, at first in the evening, and subsequently during and after all his meals. He has vomited a little blood on three or four occasions. The character of the vomited matters is reported by him to have been as at present.

SYMPTOMS ON ADMISSION.—The tongue is clean; there is no pain in swallowing nor any difficulty till the food reaches a point which he indicates as beneath the lower part of the sternum and the epigastrium. He has to rest after each mouthful till the food passes this point. If it passes he has no further pain; but the greater part does not pass, and causes him great pain till it is dislodged by vomiting. The matter vomited consists of undigested food and clear mucus. Fluids and solids are equally troublesome for him to swallow. He has often hiccup while eating, and brings up flatus with great relief. He feels a constant "working" at his stomach. There is a fulness and resistance on palpation over epigastrium; but little tenderness and no tumour. The area of hepatic dulness vertically below the nipple measures three inches, and laterally three and a-half. No splenic enlargement detected. No abnormality on examination of abdomen. Bowels are rather costive. The cardiac dulness at the level of the nipple is 1¾ inch. The apex is felt and distinctly seen beating in the sixth intercostal space, and it is seen also in the fifth intercostal space. These two pulsations alternate, or are not exactly synchronous. At the apex, over a limited area of about one square inch, a short, blowing murmur, not loud, is heard with the first sound, the second sound being healthy. At the base, both sounds are feeble, but free from abnormal murmur. The pulse is 76; irregular in rhythm. The respiratory system is normal, with the exception of a few snoring râles posteriorly. The urine is high coloured, sp. gr. 1027; not albuminous.

PROGRESS OF THE CASE.—I took charge of this case on the 1st of May, up to which time his symptoms had continued the same, notwithstanding careful regulation of his diet and the administration of morphia, tr. ferri muriatis, creosote, wine, and the application of a blister. The report on *May 12th* is:—No improvement; pain in the epigastrium still severe. He is weaker, much emaciated, and destitute of appetite. *May 30th.*—Patient's diet now consists of arrow-root twice daily, beef-tea, tea and bread, and ℥iv of sherry wine. He is unable to take any other nourishment. Since admission, has been rarely out of bed. *June 10th.*—No change in symptoms. Continues same diet. *July 1st.*—For the past week the strength has gradually increased. He has been up out of bed for several days, and to-day he ventured into the green for a short time. Has some calf's foot jelly. *July 19th.*—Has relapsed: he now feels a constriction higher up in the œsophagus, opposite the lower part of his throat, and is unable to swallow even the little he has hitherto taken. Is greatly emaciated. Weakness extreme. *July 27th.*—Complains now wholly of the constriction superiorly. Beef-tea enemata with port wine have been ordered four times a day. *July 30th.*—Enemata discontinued from the resistance of the patient. He is able to swallow wine, which he relishes. *Aug. 2d.*—Since last report, in same state, but more feeble; lies very much on his left side; groans at intervals, his voice being comparatively strong; but articulation is very indistinct. Has no cough nor apparent dyspnœa. Not taken any food for four days. *Aug. 3d.*—Died apparently from exhaustion at 10.30 P.M.

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* Reported by Messrs. J. T. Walker and W. H. Davies, Clinical Clerks.

Sectio Cadaveris.—Thirty-nine hours after death.

Body presented the last stage of emaciation, the abdominal wall at the umbilicus being so retracted as to be in contact with the vertebral column.

THORAX.—The pericardium was universally adherent; the adhesions were old and firm. The lower half of each aortic valve was thickened and almost rigid; but on trial there is no incompetence. The heart weighed nine and a half ounces, the left ventricle being slightly thinner than usual. Both lungs were emphysematous anteriorly; and throughout the spongy portion, indurated nodules could be felt varying in size from a coffee bean to that of a hazel nut. On section, these presented aggregations of miliary tubercle of a yellow colour, for the most part of cheesy consistence, but here and there softened, forming purulent collections and small abscesses the size of a pea. In the left lung, the posterior third of the lower lobe presented all the characteristics of red, in one or two places passing into grey, hepatization. In the right lung, posteriorly, were two or three masses of red hepatization the size of a walnut.

DIGESTIVE ORGANS.—The posterior third of the tongue presented a tuberculated appearance; the mucous membrane on section was found thick, dense, almost cartilaginous, of greyish colour, and yielding on pressure a thin greyish-white juice. The mucous membrane of the pharynx was natural. In the œsophagus, an inch and a half above the bifurcation of the trachea, there existed a stricture admitting only the point of the little finger. When opened, the mucous membrane appeared natural, the sub-areolar tissue somewhat thickened. Lower down, the cardiac orifice was felt excessively contracted, so that nothing larger than a crow's quill could be passed through it. The stricture extended along nearly two inches in length, being strictly limited to the œsophagus. The liver and stomach being removed together, a large mass of greyish-white colour and firm consistence was found projecting from the posterior surface of the liver, and firmly adherent to the cardiac portion of the stomach just where the œsophagus enters it. From the surface of the liver there projected other rounded masses of greyish-white colour, with central depressions, and so firm as to creak under the knife. On laying open the stricture, the mucous membrane was found not ulcerated; but in the submucous tissue was deposited hard, cancerous matter, not separable by any margin from the similar substance already described as projecting from the liver. The stomach was contracted, but otherwise healthy.

ABDOMEN.—The kidneys felt indurated; but, when examined, appeared natural. The spleen weighed only two ounces; its structure was natural. Other organs healthy.

MICROSCOPIC EXAMINATION. — The cancerous masses in the liver and in the œsophagus contained numerous large cancer cells in all stages of development, embedded in a fibrous stroma. The tubercles in the lungs exhibited the usual appearance of miliary tubercle in various stages of disintegration, associated with pus. The red and grey hepatization was composed of an exudation in the air cells and smaller bronchial vessels, which presented various stages of transformation into pus, being most recent in the former, and most perfect in the latter. Many of the pus cells contained fatty granules, and exhibited different degrees of disintegration.

Commentary.—This man literally died of starvation, from the utter impossibility of introducing nourishment into the system. The cancerous mass originally formed in the liver, had surrounded and compressed the œsophagus and cardiac orifice of the stomach, as to reduce the canal to the size of a crow's quill, a stricture that extended through a curved line, nearly two inches long. A second stricture, but not to so great an extent, existed above this in the œsophagus. It is not surprising, therefore, that at last no kind of nourishment could pass these obstructions, the absence of contractile power in the diseased œsophagus above being insufficient to propel even fluids through the stricture below.

What appears to me, however, the most remarkable feature in this case, is the occurrence in the same individual of recent cancer, tubercle, and pneumonia. Whether the tubercle or the cancer was first formed, it becomes exceedingly difficult to determine, but certainly the nodulated groups of miliary tubercle in the lungs were in every respect similar in general appearance and structure to what is observable in phthisical cases. It is true there was no especial accumulation of tubercle at the apex of either lung, neither was there cough nor any symptoms of pulmonary disease shown throughout the whole course of his disease. But as a decided form of exudation its presence was undoubted. The pneumonia must have come on during the latter days of his life, when he was in a state of extreme weakness. But it occasioned no active symptoms, and though conjoined with great emphysema anteriorly in both lungs, produced no dyspnœa. The pathological fact, however, of the occurrence of these three forms of exudation in one individual is, though undoubtedly rare, well calculated to demonstrate the fallacy of all exclusive views as to their production in individuals of a peculiar diathesis.

Temporary dysphagia occasionally occurs in cases of hysteria or of spinal irritation, but when permanent it is always the result of organic disease of the pharynx or œsophagus. In the great majority of cases it is owing to some growth, cancerous, epitheliomatous, aneurismal, or of some other form, which by attacking the parts themselves induces stricture of its walls, or by compressing them from without causes a mechanical obstruction to the tube. In a few rare cases it has depended on pouch-like, or spindle-form dilatations, which, by becoming impacted with food, have caused the impediment. In all these cases, the cure will depend on the means at our disposal of removing the obstructing cause, such as external tumours compressing the part. But if it depend on disease of the pharynx or œsophagus, the treatment must be for the most part palliative. There may be a simple stricture, which may require surgical interference by bougies or catheters, but more generally, as observed by the physician, it is the result of cancer or epithelioma as in the cases narrated. Under such circumstances, the treatment must be directed to support nutrition by unirritating food, given in small quantities and in a form that the patient can most easily swallow. Remedies of various kinds to alleviate or check the vomiting may be tried, but are seldom of permanent benefit. Very rarely, an effort at healing is set up by nature, which for a time causes diminution in the more distressing symptoms, of which Case XIII. is a remarkable example.

FUNCTIONAL DISORDERS OF THE STOMACH.

CASE L.*—*Dyspepsia.*

HISTORY.—James Scott, æt. 51—admitted 27th September 1852. He states that, about two months previous to admission, he experienced severe shooting pains darting from the left scapula to the epigastrium and left hypochondrium. For many years back he has been much addicted to intemperate habits, and latterly the appetite has been considerably impaired.

SYMPTOMS ON ADMISSION.—On admission, the tongue is furred, and cracked in the centre; he has almost constant sour taste in the mouth, worse in the morning after taking food; frequent acid eructations; bad appetite, and considerable thirst. About a quarter of an hour after meals he experiences a feeling of heat and pain in the epigastrium, with acid eructations and flatulence; the latter also troubles him during the night, when the stomach is empty. These symptoms continue generally for about an hour and a half, when they gradually abate, and soon after disappear entirely. He then again takes food, and the symptoms return in about a quarter of an hour afterwards, as already noticed. He does not think that one kind of food disagrees with him more than another. He has often much nausea and loathing of food, but no vomiting. There is some tenderness on pressure at a point about the centre of the epigastrium, where he states there is always more or less pain, generally of a dull, heavy character, but sometimes occurring in sharp twinges, shooting to the left scapula, and somewhat increased on pressure. There is no unusual hardness or tumour to be felt; and there is no dulness on percussion. There is no tenderness or enlargement of the liver; urine normal. He is of a very desponding disposition, and does not sleep well at night. Other functions normal.

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* Reported by Mr. James D. Maclaren, Clinical Clerk.

℞ *Potassæ bicarbonatis*, ʒij; *Tinct. gentian* co., ℥i; *Infus. gentian* co., ℥v. *M. ft. Mist. Half a wine-glassful to be taken thrice a-day.*

Progress of the Case.—*December* 31*st.*—Still complains of flatulence and distension of the abdomen; considerable pain in the epigastrium, increased on pressure. *Applicentur hirudines, quatuor epigastrio et postea, foveatur. Jan.* 3*d.*—Appetite improved; still acid eructations, with sour taste in the mouth; pain in the epigastrium, relieved after the application of the leeches and warm fomentations. He is very desponding about his complaints, which he much exaggerates. *Jan.* 10*th.*—The sour taste and flatulence diminished; pain and uneasiness in the stomach much relieved; no tenderness on pressure; appetite much improved; no sickness or vomiting; bowels regular; stools natural. Dismissed in order to return to his work. The diet ordered has been of a gentle, unstimulating, but nutritious kind.

Commentary.—In this case derangement of digestion depended on intemperate habits, and was accompanied by excess of acidity in the stomach. The treatment was directed to counteract this condition by alkalies, vegetable bitters, and a regulated diet, which, to a certain extent, succeeded. But all such cases require exercise, regular habits, and moral control, without which medical treatment is unavailing.

Case LI.*—*Dyspepsia—Oxaluria.*

History.—John Millar, æt. 28, a typefounder, admitted December 26th, 1852. He states that he had always enjoyed good health, with the exception of occasional palpitation of the heart, until about eight months ago. Vertigo came on suddenly when he was at work, but disappeared in a few minutes. Since then, he has had many attacks of the same kind; and of late, these have been accompanied with pain and palpitation of the heart, and *tinnitus aurium.* Some years ago he was much addicted to drink, but for the last four years he has been more temperate.

Symptoms on Admission.—On admission, the heart was found to be healthy, and the pulse natural. The tongue was dry in the centre, moist and white at the edges, with numerous transverse fissures. He had a disagreeable taste in his mouth in the morning, and no appetite for food; had never vomited, nor experienced pain in the stomach; bowels constipated. There was an anxious, haggard expression of countenance, and an evident tendency to exaggerate his symptoms; he complained of vertigo, tinnitus aurium, and muscæ volitantes. The urine after standing some time, exhibited a slight deposit, in which numerous large crystals of oxalate of lime were visible on microscopic examination; sp. gr. 1028; otherwise normal. The other functions were normal. ℞ *Acid. nit.; Acid. muriat.* āā ʒiss; *Tinct. gent.* co., ℥i; *Infus. gent.* co., ℥v *M. A table-spoonful to be taken three times a-day.*

Progress of the Case.—*January* 8*th.*—Since last report, the oxalates have disappeared, the appetite has improved, the cardiac and cerebral symptoms are removed, and he was now dismissed cured.

Commentary.—Dr. Golding Bird was the first to point out that oxaluria, associated with dyspepsia, was a very common disorder, and that its treatment by nitro-muriatic acid was the most successful one.

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* Reported by Mr. James D. Maclaren, Clinical Clerk.

The oxalic acid is probably derived from urea or uric acid, and its presence in the urine is often associated with or alternates with these compounds. No doubt the tonic treatment practised in the above case is the best mode of relief, but here also a regulated diet, with exercise and mental occupation, are necessary to render permanent any benefit that may be derived from treatment.

CASE LII.*—*Dyspepsia—Hypochondriasis—Oxaluria.*

History.—Thomas Pollock, æt. 24, hawker, admitted 25th December 1852. He says that, three years and a half ago, when stooping down in a field during a dark night to evacuate his bowels, he felt a sharp, hard body, like the stump of a shrub, penetrate his anus, causing acute pain, which continued for a fortnight, and has occasionally returned ever since. No blood passed at the time, but he has been under the care of various medical practitioners, and undergone numerous kinds of treatment. He has never had diarrhœa; but is addicted to masturbation. He has consulted the numerous works advertised in the papers on manly vigour, etc., but has derived no benefit from them.

Symptoms on Admission.—On admission, tongue moist, but furred, cracked, and fissured in the centre; says he experiences a feeling of load after taking food, with occasional nausea. He has no vomiting, but an acid and sometimes a disagreeable taste in the mouth; frequent flatulence and constipation, for which he is in the habit of taking aperient medicine. On placing the hand on the epigastrium, he says that there is soreness beneath the xiphoid cartilage, increased on pressure. Has occasional involuntary emissions of semen. The urine contains a slight sediment on standing, which is crowded with large and small crystals of oxalate of lime; sp. gr. 1020; otherwise normal. Sleepless at night; anxious and desponding about his complaints, which he attributes to the accident formerly mentioned, although it produced no local effects at the time, nor any structural change since. Says that he has frequent vertigo, tinnitus aurium, muscæ volitantes, and cephalalgia. The other functions are normal. ℞ *Acid. nitrici; Acid. muriat.* āā ʒi; *Tinct. gent.* co., ℥i; *Infus. gent.* co., ℥v *M. A table-spoonful three times a-day.*

Progress of the Case.—*January 3d.*—He has continued to take the acid mixture, but does not admit that he is in any way better. On the 2d, the oxalates disappeared from the urine, and were replaced by a copious deposition of amorphous lithates. *Omittatur mist. acid.* ℞ *Liquoris potassæ*, ʒij; *Tinct. cardamom.* co., ℥i; *Infus. quassiæ*, ℥vii *M. Two table-spoonfuls night and morning. Jan. 4th.*—As he still continues to complain of pain in the sacral region, which he attributes to the accident, *a blister, three inches by four, was ordered to be applied there. Jan. 10th.*—Since the application of the blister, the pain in the sacrum has disappeared. He expresses himself as being much better, and was now dismissed.

Commentary.—In this case the presence of oxalates in the urine were associated with the same class of symptoms as in the former one, but the tendency to exaggerate his complaints was more marked, and there was a firm belief in their being caused by an accident, which possibly never happened; and if it had, could not have occasioned them. The acid and tonic mixture removed the oxalates, but lithates took their place in the urine, which, in their turn, were got rid of by alkalies. Still, the fixed idea as to the cause of the disease continuing, he seemed no better. A blister was now applied to the sacrum, when he readily adopted the idea that his local complaints disappeared with the pain of the blister, and he became cheerful and well. No case could better illustrate the effects of mental depression on the digestive organs than this. For a period of three years he had been the subject of delusion and genital irritations, heightened by the study of those publications, which, to the disgrace of the newspaper press, are daily advertised to the people as the only means of restoring vigour to the constitution. At length, satisfied of their inefficiency, he entered the Infirmary; the error of his practices was kindly pointed out to him, nutritious diet, regular habits, and tonic treatment were obviously beneficial; and fortunately his hypochondriasis yielded to the simple expedient of substituting real for supposed pain, and leading him to imagine that the one had cured the other.

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* Reported by Mr. William Calder, Clinical Clerk.

General Pathology and Treatment of Dyspepsia.

By dyspepsia (from δυσπεπτω, to digest with difficulty) is generally understood, all those functional derangements of the stomach which are primary in their origin, that is, not dependent upon, or symptomatic of, inflammation or other disease in the economy. Such a disordered condition is exceedingly common, and often constitutes the despair of the physician, arising, as it frequently does, from causes which are often obscure, or, if discovered, are beyond his control. This will become apparent by considering, in the first place, those circumstances which require to be united to secure a healthy digestion. These are— 1st, A proper quantity and quality of the ingesta. 2d, Sufficient mastication and insalivation. 3d, Active contractility in the muscular coat of the stomach. 4th, Proper quantity and quality of the gastric, biliary, and pancreatic fluids. 5th, A consecutive and harmonious action of the intestinal canal. Dyspepsia, or indigestion, may be produced by any cause which occasions derangement of one or more of these conditions; and hence why so many different circumstances may produce somewhat similar symptoms, and why so many different remedies have been found effectual in various cases. Notwithstanding that you will frequently meet with instances which baffle all preconceived rules, there can be no doubt that a careful attention to the essential physiological conditions above enumerated will, in the great majority of cases, conduct you to a successful rational treatment. Thus—

1. Of all the causes of dyspepsia, excesses in eating and drinking are the most common. An over-distended stomach, or too rich a meal, not unfrequently induces a feeling of weight or fulness in the epigas-

trium, nausea and eructation of acid, bilious, or gaseous matters, with a loaded tongue, headache, and other general symptoms. This is acute dyspepsia, or the *embarras gastrique* of the French. Occasionally, there is more or less vomiting of bilious matter, when the attack is vulgarly called a *bilious seizure.* If called to see such a case, immediately on its occurrence, and before the ingesta have left the stomach, as determined by the sense of load at the epigastrium and by percussion, an emetic should be given; but if vomiting be present, it should be assisted by warm diluents. As soon as the stomach is quieted, or, if you have been called in at a late period, when the ingesta have passed into the intestines, a purgative should be administered, consisting of four grains of calomel, with four of compound extract of colocynth, followed in a few hours by a draught of salts and senna. If necessary also an enema may be given. The purging, with a day or two's confinement to farinaceous food, will generally get rid of such an attack; but their frequent repetition leads to the chronic form of dyspepsia, when careful regulation of the diet with exercise, must constitute the chief treatment. Hence the advantage of what is called "change of air," and much of the benefit which is derived from watering places. Chronic dyspepsia, however, is far more commonly caused by excess of spirituous and vinous drinks, than by eating, when abandonment of the evil habit is a *sine qua non* in the treatment. Tea drinkers are very liable to the disease, and its frequency among female servants is probably owing to this cause.

2. It may frequently be noticed, that those who have acquired the habit of eating rapidly are more or less dyspeptic. I knew a journeyman printer who was much tormented with indigestion, but who was cured by changing his residence. The cause of this was for some time a mystery, but on again changing his house the disease returned, although no apparent cause could be discovered. I ascertained, however, that it depended not on the locality *per se*, but on its distance from the printing house. When far off he ate his dinner with his family rapidly, having only just time enough to walk home and back within the hour. When he lived near, the time otherwise spent in walking was occupied in eating, or in cheerful converse with his wife and family. Since I made this observation, it has often occurred to me that the distant residences of artizans from their place of employment may be the occasional cause of the dyspeptic symptoms they frequently possess. With regard to the exact object of the saliva in the process of digestion, whether it be to convert the farinaceous compounds of the food into glucose, or by its viscidity to mix up air with the portions swallowed, is not positively determined; but its necessity for the digestion of man is shown by cases where the under lip has been lost by accident or disease, or where salivary fistulæ have formed, in which dyspepsia is generally present, and in which the disordered digestion has been cured by operations that, by restoring the parts to their normal condition,

prevent the escape of saliva. Again, persons habituated to the dirty habit of spitting, are for the most part dyspeptic. In all cases where dyspepsia can be traced to this source, the treatment must be obvious.

3. The contractile movements of the stomach which, by kneading the ingesta, and keeping them in constant motion, secures an intimate admixture with the gastric juice and the rapid transference to the duodenum of such portions of it as are transformed into chyme, are evidently of immense importance to a proper performance of digestion. The experiments of physiologists have shown that digestion in gastric juice out of the stomach is much slower than in it, and that section of the pneumogastric nerves, by arresting the contractile movements, only permits the circumference of the mass in contact with the secreting surface to be digested. These facts at once explain the well-known influence of mental emotions upon the stomach. Contentment and hope are as favourable, as dissatisfaction and despondency are opposed to good digestion. Nothing is more common than dyspepsia among literary men who overtask the mental faculties; among young persons of very excitable minds; and among individuals of a melancholy temperament, hypochondriacs, etc. etc. It is in such cases that cheerful society, active and appropriate occupations, change of scene, removal from mercantile or literary employments, different trains of thought, and so on, are beneficial. Hence also many of the good effects of travel, visits to watering places, etc. etc.

4. Our knowledge with regard to the offices performed by the gastric, biliary, and pancreatic juices in digestion has of late years been much advanced. Thus the gastric juice more especially operates on the albuminous, and the pancreatic juice on the fatty compounds of the food. The function of the bile is perhaps more obscure, although it probably acts as a means of precipitating or separating some of the excretory matters from chyme, and so facilitates assimilation of the nutritive portions. Digestion may be deranged by all those causes which too much increase or diminish the secretion of these three fluids. Thus excess of acidity in the stomach is one of the most common causes of dyspepsia, producing that form of it which accompanies scrofulous and tubercular diseases. It may be in such excess as to neutralise the alkaline action of the pancreatic juice, and render it difficult or impossible to emulsionise fatty matters. In such cases, alkalies, with bitter tonics and the direct introduction of animal oils in excess, are indicated. On the other hand, the gastric juice may be diminished in quantity, as frequently occurs in persons who suddenly overtask the powers of the stomach at feasts, or in old persons with feeble digestion. The sense of load after eating is generally indicative of slow digestion from this cause. In acute cases, a stimulant rouses the stomach to increased action, and hence the moderate use of drams and generous wines after dinner is occasionally useful. In old persons

the sense of load and feebleness is best removed by giving up tea, and drinking at night a little weak brandy and water. In chronic cases, acids are indicated, especially muriatic acid. *The Tr. Ferri. co.* of the pharmacopœia is a useful preparation in chlorotic females. The prepared gastric juice of the calf has been lately recommended as a remedy in these cases.

We have no distinct means, as far as I am aware, of rousing the pancreas into action, and yet many cases are on record in which fatty matters have passed undigested through the alimentary canal in consequence of obstruction to the pancreatic duct. In such cases, and all those in which fatty matters are difficult to digest, alkalies, especially the *sodæ bicarb.* with vegetable tonics, are indicated.

When the bile is deficient, constipation and dyspepsia are usual results, and are to be relieved by gentle mercurial purgatives, with extract of taraxacum, and by remedies, such as rhubarb and especially the compound rhubarb pill, which, by acting on the duodenum, also favour the flow of bile into the upper part of the alimentary canal. Dr. Clay of Manchester has recommended in such cases the administration of ox-gall, a remedy, which, although not extensively given, is evidently rational, and calculated by its purgative action to be highly serviceable. Excess of bile, on the other hand, ought to be treated by drastic purgatives, diuretics and diaphoretics, according to circumstances, to cause excess of excretion. Exercise should also be insisted on to call the lungs into action, and thus relieve the liver in its office of separating hydro-carbon.

5. A derangement of the consecutive and harmonious action of the alimentary canal is another frequent cause of dyspepsia, for it is as necessary that those portions of the food which are not assimilable should be removed out of the economy, as that the nutritive materials should be absorbed. Hence whatever impedes the contractility of the intestinal canal, whatever alters the structure of its mucous membrane, or whatever mechanically obstructs its calibre, may always be observed to induce dyspeptic symptoms. The removal of these various conditions, whether by stimulating the nervous centres, by appropriate diet, or by purgatives and astringents, as they may be required, need not be more particularly dwelt upon.

In many cases of dyspepsia, two or more of these classes of causes may be combined, so as to render the indications for treatment complex and apparently contradictory. In other cases, one or more causes may exist, although from the indications presented they cannot be determined, when our treatment must always be more or less vague and unsatisfactory. Lastly, there are a few instances where dyspepsia can only be explained by *idiosyncrasy*, in which we find this or that particular article of diet to derange the digestive functions, and in which avoidance of the offending cause is the only plan that is attended with success.

In addition to the different kinds of dyspepsias to which I have directed your attention, it is practically important to keep in remembrance the leading symptoms which may be present, and the remedies by which they may be removed. These are anorexia, acid eructations, sense of load in the stomach, cardialgia, vomiting, flatulence, palpitations of the heart, and cephalalgia. Some persons talk of a stomach cough, which, however, is more commonly dependent on irritations in the œsophagus or pharynx, which have hitherto been overlooked. I have already alluded to the mode of treating most of these symptoms. Palpitations of the heart often occasion alarm in young dyspeptic persons, and in addition to remedies directed towards the stomach, change of scene, removing attention from the affected organ, and varied reading should be enjoined. The sense of load in the stomach is most frequently removed, as we have previously said, by acids, whilst acid eructations and cardialgia are best relieved by alkalies and bitter tonics. Vomiting and flatulence are often very troublesome symptoms, and the varied remedies which may be employed in a case of chronic vomiting may be gathered from the following history:—

CASE LIII.*—*Dyspepsia—Vomiting of Fermented Matter containing Sarcinæ.*

HISTORY.—Thomas Spence, æt. 53, a weaver. Admitted September 6, 1852. He states that, for fourteen or fifteen years past, he has been subject to occasional vomiting, which generally occurred on Sundays, owing, he supposes, to want of exercise at his usual employment. On these days he scarcely ever took his meals from fear of the almost certain vomiting which would follow. For two or three years past he has been liable to frequent heartburn, water-brash, and acid eructations, but was able to continue at his usual employment till about six months ago. Since then, he has been gradually losing his appetite, and his strength has become much prostrated. He has never vomited blood or any dark-coloured matter, and has never passed any such by stool.

SYMPTOMS ON ADMISSION.—On admission tongue clean; no difficulty in deglutition; appetite capricious, but always best in the morning and early part of the day. Shortly after taking food, he begins to have uneasy sensations in the epigastrium, sickness, and a sense of weight at the stomach. When these symptoms appear, the abdomen generally begins to swell, and in about an hour to an hour and a half the food is frequently vomited. The rejected matters consist generally of the half-digested food, with a thick, dirty, frothy scum on the surface, resembling yeast. He has also frequent pyrosis, acid eructations, and flatulence, the latter sometimes so great as to occasion a sensation of choking, especially after vomiting. These symptoms are worse after some kinds of food than others: oatmeal, especially in the form of porridge, produces them in the severest form; broths, vegetables, or any kind of slops, do not agree with him; animal food suits him best, but when even this is taken for any length of time, the symptoms soon re-appear. The abdomen at present is much swollen, very tense, and tympanitic on percussion, with considerable tenderness over the epigastrium. The bowels are generally constipated; the stools usually of a dark colour and hard consistence. He has occasionally slight pain and difficulty in voiding his urine, which is slightly phosphatic. Other functions are normal.

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* Reported by Mr. William Calder, Clinical Clerk.

Progress of the Case.—On taking charge of this patient on the 1st of November, I found him vomiting from time to time large quantities of fluid mixed with undigested matters, on which there gathered, after a short time, a thick brownish scum, exactly resembling yeast. On examining this scum with the microscope, it was ascertained to contain a large number of sarcinæ ventriculi (see p. 214, Fig. 80), mingled with starch corpuscles, more or less broken down, and granular matter. From the ward books, I learnt that his treatment had consisted in the successive administration of,—1. The local application of leeches ; 2. Of the sulphite of soda, in scruple doses, with two grains of aromatic powder three times a-day ; 3. Of half a grain of protochloride of mercury at night ; 4. Of a scruple of the sulphite of soda every three hours, which was subsequently increased to half a drachm ; 5. Of creasote mixture ; 6. Of a naphtha mixture ; 7. Of bismuth and aromatic powders ; and 8. Of pills of calomel and opium. These different kinds of treatment, some of which, especially that of the sulphite of soda, had been continued for several weeks without intermission, seemed to have produced no good effect. *November 11th.*—During the last four days, he has vomited every night, four hours after dinner, that is, about six P.M. The ejected matter presents the same yeast-like character formerly described ; but the sarcinæ, though still abundant, are not so numerous. He complains of a great sense of distension, and a feeling of "working" or "bubbling" in the stomach shortly before vomiting. ℞ *Acid. Hydrocyan. dil. Min.* xviij ; *Syrup. Aurant.* ʒi. *Aquæ* ʒii *M., half an oz. three times a-day. Nov. 20th.*—The hydrocyanic acid checked the vomiting till last night, when it returned with more violence than ever. *Nov. 24th.*—Vomiting still continues regularly every day. *Omittatur Mist. Acid. Hydrocyan.* ℞ *Liquor. Potass.* ʒss *Aquæ* ʒvss. *Two table-spoonfuls to be taken every four hours. Dec. 2d.*—Alkaline mixture again checked the vomiting, which, however, returned last night to a slight degree. *Applicet Vesicat.* 4 x 5 *Epigastrio. Dec. 8th.*—Vomiting has once more returned daily since last report. ℞ *Tinct. Ferri. Muriat.* ʒi. *Sumat* ʒss *ter in die ex aquâ. Dec. 16th.*—The vomiting has been again checked, but once more returned in a slight degree at one A.M. this morning. The matter ejected exhibits very little of the usual frothy scum, but consists of a brown liquid like coffee, with a few shreds of undigested food. It is of intensely acid re-action, and contains only a few sarcinæ. The dose of the Acid Tincture has been reduced to M. xv. The diet during this period has been principally animal, porridge and vegetables invariably increasing his complaint. To-day he left the hospital to visit his friends in the country, expressing himself as greatly relieved.

Commentary.—The kind of chronic vomiting and dyspepsia which is above described has been long known in Scotland, and was described by Cullen as a form of pyrosis. It has been supposed to be associated with the habit of largely consuming oatmeal as a principal part of the diet, although its real pathology was unknown. In 1843 Mr. Goodsir discovered in the ejected matter from the stomach, in a case of this kind, organised forms, which, from their resembling a wool pack, he denominated *sarcinæ.* He considered that they were of a vegetable nature, and by multiplying fissiparously, communicated to the contents of the stomach the appearance of yeast, which is also known to be dependent on the development and growth of vegetable structures. This occurrence in the stomach of course explains their frequent presence in the fœces, although, whether they ever are developed in the intestines is unknown. On one occasion, however, I have seen them in the urine, which occurred in the case of a gentleman under the care of Dr. Mackay of this city. The sarcinæ vesicæ were in that case uniformly smaller in size than the sarcinæ ventriculi. They have also been discovered in an abscess of the lung by Virchow, and I have recently seen them in the juice squeezed from an œdematous lung. The origin and exact mode of development of these structures are unknown; but little doubt can exist that their presence is the real cause of the chronic vomiting and other symptoms of the individuals affected, and that the cure will depend on such means as are capable of insuring their destruction and preventing their return. It must be obvious, however, that the same means which destroy or check vegetable growths on the surface of the body (see Favus), are not applicable to the mucous lining of the stomach. Besides, we are ignorant whether these parasites grow in an exudation poured out on the mucous membrane, or are developed only in a fluid. Again, it is very possible that on being introduced from without, the conditions necessary for their development may be dependent on some kinds of ingesta, a view which derives support from the facts observed in the case before us, namely, that they were always increased by farinaceous kinds of food. On all these points, however, we are as yet ignorant, and our efforts at cure hitherto have not so much been directed to cutting off the sources of growth, as to destroying it after it has proceeded to a certain extent. With this view it has been imagined that the sulphite of soda would destroy them, by causing, on its union with the gastric juice, the extrication of sulphurous acid, which is so destructive to vegetable life. This remedy has consequently been given, and, not unfrequently, with success; but in the present case it was of no benefit. Subsequently a variety of medicines were administered, several of which succeeded in checking the vomiting for a time. Indeed, it was remarked that the mere circumstance of changing the medicine was sufficient to stop the vomiting for several days, when it returned and continued as before. Of all the numerous remedies tried, the Tr. Ferri Muriatis seems to have done most good. The following case offers a remarkable contrast to the one just given, for although of some standing, it was rapidly cured by the sulphite of soda.

CASE LIV.*—*Dyspepsia—Vomiting of Fermented Matter containing Sarcinæ.*

HISTORY.—Christina Torrence, æt. 18, servant, admitted July 11, 1853. For the last three years has been suffering from more or less pain in the stomach, loss of appetite, occasional vomiting, generally soon after meals. The ejected matters have always been very acid, and have varied in appearance with that of the food taken, which, for the most part, consisted of tea and porridge, with very little animal food. She is thin, and her general strength has been much reduced. She has taken all kinds of medicines, and has been treated homœopathically for some time without the slightest relief.

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* Reported by Mr. Joseph Johnston, Clinical Clerk.

Progress of the Case.—On admission she was ordered bismuth and aromatic powders, which slightly alleviated some of the symptoms. On the 14th, however, there was vomiting of a brown frothy fluid, to the extent of ʒiv, which, on microscopic examination, was demonstrated to contain numerous sarcinæ. *A scruple of Sulphite of Soda was ordered to be taken three times a-day.* On the 22d, vomiting again returned, but the rejected fluid contained no sarcinæ. From this time all pains ceased, other symptoms disappeared, and she was dismissed quite well July 28th.

ORGANIC DISEASES OF THE STOMACH.

Case LV.*—*Chronic Ulcer of the Stomach—Recovery.*

History.—Janet Grant, æt. 30, married—admitted 14th November 1852. She stated that she enjoyed tolerably good health till twelve months ago, when she had an attack of hæmatemesis, which returned on three successive days early in the morning. The vomiting was preceded by a sense of weight and uneasiness in the epigastrium, nausea, dimness of sight, and feeling of syncope, which actually occurred on one or two occasions. After vomiting took place, she generally suffered from severe griping pains in the bowels until they were opened. The stools were often of a dark brown colour. The quantity of matters ejected from the stomach varied from one to two pints, and contained coagula of blood. She has been twice received into the Infirmary, and on both occasions dismissed much relieved. Since January 1852, she has continued in good health, and been able to follow her usual occupation till the 3d of November 1852, when the hæmatemesis returned, having been preceded by the symptoms already enumerated. On this occasion there was less blood than formerly; but the vomited matter still contained numerous bloody coagula. She had no recurrence of vomiting for eight days, but remained very weak and confined to bed. On the 11th November she passed by stool some matters like slimy tar. Since then she has frequently vomited, sometimes as often as three or four times a-day, a quantity of matter consisting principally of dark-coloured blood. The pain in the head, epigastrium, and between the scapulæ, have increased since that time.

Symptoms on Admission.—On admission, tongue moist, slightly loaded; appetite bad; food is rejected from the stomach almost immediately after being taken; pain and tenderness in the epigastrium on pressure; slight tenderness over the whole abdomen, which becomes much distended after taking food. Bowels rather costive; no blood in the stools at present, and no blood corpuscles in the vomited matters when examined by the microscope. Urine normal. Other functions normal. ℞ *Sulph. Magnes.* ℥ss; *Acid. Sulph. dil,* ʒi; *Infus. Rosarum* ℥viij. *Sumant.* ℥ij, *et repetant. cras mane.* ℞ *Acid. Gallic.* ʒi; *pulv. opii* gr. iij. M. *et divide in pulv.* xij. *Sumat* i *ter in die.*

Progress of the Case.—*November 15th.*—Had some vomiting to-day, but no blood. Still considerable pain in epigastrium. Bowels freely moved by medicine; stools very dark in colour. *Nov. 17th.—Omitt. Acid. Gallic.* ℞ *Bismuthi albi* ʒss. *Pulv. Opii* gr. iss M *et div. in pulv.* vj. *Sumat* i *ter in die. Farinaceous diet. Nov. 18th.*—Complains of burning pain at lower part of the sternum; former pain in epigastrium somewhat easier; no vomiting since the 16th; bowels open; stools still of a dark colour; great thirst; tongue loaded and coated with brown fur in centre; with bad taste in the mouth. *Nov. 20th.*—Still considerable pain and tenderness in epigastrium, which is now referred to one spot about the size of a crown piece; bowels confined; pulse 75, natural. *Applicentur hirudines* iv *epigastrio, Repetat. Mist. Cathartic. si opus sit. Nov. 23d.*—Complains still of pain in epigastrium, which was slightly relieved by the leeches; has had no return of vomiting; bowels open. *Applicet. Vesicat.* 3 by 2 *epigastrio. Nov. 26th.*—Pain in epigastrium considerably relieved since the application of the blister. Still bad appetite and sour taste in mouth. ℞ *Carb. Potass.* ʒi *div. in pulv.* xij; *sumat* i *ter in die. Dec. 9th.*—Pain in epigastrium much relieved, and only returns at intervals, and in much less degree than formerly. She now takes her food well; bad taste in mouth gone; bowels still costive; pulse 80, of good strength. *Dec. 11th*—Her former stomach symptoms have entirely disappeared. Dismissed.

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* Reported by Mr. F. M. Russell, Clinical Clerk.

Commentary.—The vomiting immediately on taking food, the hæmatemesis, and the local pain increased on pressure, indicated an ulcer of the stomach, which had eaten at several times into blood-vessels, and caused extravasations of blood. Before I saw her, an astringent mixture, with gallic acid, had been ordered to check the tendency to hemorrhage. For this I substituted quietude, a farinaceous diet to be taken in small quantities at a time frequently repeated, and powders of white bismuth and opium to check acidity and relieve pain. The pain not subsiding, six leeches were ordered to the epigastrium, followed by warm fomentations, and subsequently a blister was applied there, and the result of this treatment was to cause gradual abatement, and at length complete disappearance of all her symptoms.

CASE LVI.[*]—*Chronic Ulcer of the Stomach—Cure.*

HISTORY.—Mary Reid, æt. 38, married, admitted December 20th, 1852. She states that about four years ago, having been exposed to cold and wet, she was seized with shivering, followed by severe pains in the epigastrium, with uneasy sensations in the lower part of the abdomen, resembling labour pains; these were accompanied by thirst, loss of appetite, sickness, and vomiting. These symptoms disappeared, and re-occurred at intervals up to December 1851, when she had a more severe attack than before, and since then she has always been complaining more or less of the same thing. About three months ago, she felt as if something gave way in the left hypochondrium, and nearly fainted. She immediately afterwards vomited about a tea-cupful of blood; this took place four or five times during the night; but the last time the ejected matters were paler and more watery, having somewhat the appearance of finely grated carrots. The loss of appetite, thirst, pain in epigastrium and bowels, with frequent severe headache, have continued up to the present time. She has had no return of the hæmatemesis, but generally vomits her food about half an hour after it has been taken.

SYMPTOMS ON ADMISSION.—On admission, she has a pale anæmic appearance. The tongue is furred, appetite bad, pain in epigastrium and distension, with a sense of load at the stomach after meals, which continues till relief is afforded by vomiting, which comes on generally in about half an hour. She complains also of pain in the left hypochondrium; has no uneasy sensations in the bowels, but habitual costiveness, for which she has been in the habit of taking laxative medicine. She has been much troubled with palpitation, but the heart sounds and impulse are normal; pulse 96, small, and rather soft; micturition normal; urine of a pale colour, sp. gr. 1022°, with slight deposit, showing phosphates under the microscope. Catamenia now present. She does not sleep well, has slight headache and occasional vertigo, with muscæ volitantes, pain in lumbar region, but no tenderness over spine. Other functions normal. *To remain quiet in bed. Farinaceous diet in small quantities. To have the bowels gently opened.*

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[*] Reported by Mr. F. S. B. F. de Chaumont, Clinical Clerk.

Progress of the Case.—*December 23d.*—Bowels moved since last report; complains of much pain in the epigastrium; has had no vomiting of blood since admission. *Applicent. hirudines* iv *part. dolent. et postea foveatur. Omitt. Alia.* ℞ *Lactis Recent.* ℥xii; *Aq. Calcis* ℥vj M. *To be taken as a drink when thirsty. Dec. 30th.*—Continues somewhat easier; complains still of occasional pain in stomach; appetite rather improved; less thirst. Bowels very costive. *Jan. 4th.*—Complains still of severe pain in epigastrium, with nausea, but no vomiting. Tongue rather furred. It has been found that the patient has been getting up and walking about after the visit, and has also been having some beef-steak, contrary to orders. ℞ *Pulv. Scammon et Pulv. Jalap.* aa gr. x M. *Hora somni sumend. Jan. 6th.*—Bowels well opened, tongue much cleaner, feels better, and slept well during the night. *To have rice diet.* Has been complaining again of pain in stomach; tongue furred, but moist; appetite rather better; slept well during the night; bowels open. *Jan. 9th.*—Has been rather sick to-day, and vomited a little during the night for the first time since admission. She still complains of pain in epigastrium. *Appl. Vesicat.* 3 × 2 *part dolent. Jan. 12th.*—Has been much relieved since the application of the blister, and expresses herself as feeling a great deal better. Tongue moist, and cleaner than before; less thirst; appetite improved; bowels still costive. *Jan. 20th.*—Dismissed cured.

Commentary.—This case in all its essential features was very similar to the former one, with the exception that vomiting, instead of occurring immediately after taking food, came on half an hour after eating. The same treatment was pursued, but was not so carefully followed, for it was ascertained that she was continually getting up and committing indiscretions, which caused return of the symptoms.

Case LVII.[*]—*Chronic Ulceration and Perforation of the Stomach—Peritonitis—Limited Pneumonia with Gangrene—Abdominal Abscess, simulating Pleurisy—Death.*

History.—Evina Clark, æt. 29, single, housemaid—admitted December 7, 1852. From the age of fifteen, she has had more or less derangement of the functions of the stomach, as exhibited by frequent vomiting of greenish matters, not preceded by any nausea. She attributes her complaint to a severe stomach disease at the age of fifteen, which confined her to bed for some months. Two months ago the vomitings became more frequent, and have continued worse than usual ever since. She has been in the habit of taking very large quantities of bi-carbonate of soda, sometimes even as much as 1 oz. per day. On the day before admission, she took a dose of castor-oil, and this morning (Dec. 7) she rose at five o'clock to stool, then returned to bed. At half-past five, she again rose to see what o'clock it was, and again returned to bed and fell asleep without having experienced any pain. About six o'clock she awoke with severe pain in the epigastrium, and a feeling of faintness. Her mistress, on being summoned to her bed-side, administered to her half a glass of brandy in some hot water. Immediately after this was swallowed, the former pain became excruciating; the abdomen was then fomented with hot water, and medical assistance sent for. The medical man ordered warm bran poultices to be applied, which somewhat relieved the symptoms; three hours afterwards the pain again becoming violent, one drachm of tincture of opium was administered, and she was sent to the Infirmary. The catamenia have always been regular.

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[*] Reported by Mr. F. S. B. F. de Chaumont, Clinical Clerk.

Symptoms on Admission.—On admission, she was in a state of extreme depression, the surface cold, face livid, pulse 108, almost imperceptible; and the house-clerk administered a draught, which was at hand, composed of *Sp. Ammon. Aromat. min.* x; *Sp. Æther. Sulph. min.* xv; *Sol. Mur. Morph. M.* xx; *Aquæ* ℥ss. *Warm fomentations to the epigastrium were also ordered.* When first seen at the hour of visit, she complained of intense pain in the abdomen, especially in the epigastrium and left hypochondrium, which was increased by pressure. The tongue was slightly furred in the centre, but moist. She had great thirst, no nausea; bowels had been freely opened at five o'clock this morning. Heart sounds normal; pulse 136, the strength having much improved since the draught, which caused no increase of the pain. Is evidently under the influence of opium. All the other functions are normally performed. *To have immediately an enema of beef-tea with an ounce of brandy. The warm fomentations to be continued.*

Progress of the Case.—In the evening the pain was diminished to a feeling of soreness; pulse 129, small; lividity of face and depression continued; surface cold; no rigors. Has had, at intervals of three hours, four enemata of beef-tea, with an egg, two containing an ounce of brandy, and two with one drachm of laudanum. She has also been sucking ice to relieve her thirst. *December 8th.*—There has been profuse sweating during the night; face is still pale; pulse 126, weak and thready; acute pain continues on pressure below ensiform cartilage. The abdomen is tense and tympanitic, but the tenderness is slight; considerable flatulence in stomach; febrile symptoms well pronounced. ℞ *Bismuthi albi*, gr. xviii; *pulv. opii* gr. iii. *M. fiant pil.* vi. *One to be taken every six hours. The nutritive and anodyne enemata to be continued. Dec. 9th.*—She vomited yesterday afternoon, 3 P.M., about a pint of green fluid, and at the same time passed a fluid feculent stool. Slept a little during the night. To-day she is somewhat refreshed, but the symptoms are the same as yesterday. *Dec. 10th.*—Yesterday evening, the epigastric pain having increased, and extended into left hypochondrium, six leeches were applied, followed by warm fomentations. To-day pain and tenderness continue; pulse 120, improved in strength. *Six more leeches to be applied. The anodyne and nutritive enemata to be continued. To suck ice to relieve the thirst. Dec. 11th.*—Bowels were open shortly before the visit; pulse 128, full; tongue dry; thirst continues; but appetite is returning. Tenderness of epigastrium and abdomen has nearly disappeared. *To have beef-tea, by the mouth, in table-spoonfuls at a time, and occasionally toast-and-water* to relieve the thirst. *Dec. 12th.*—The beef-tea produced a disagreeable but not painful sensation in the stomach, but there has been no vomiting. Pulse to-day 128, of good strength; feels much easier, and can turn herself more freely in bed. There have been two fœcal evacuations since yesterday. *Dec. 13th.*—She has no pain; pulse 128, of moderate strength. *To have a little toasted bread soaked in beef-tea. Dec. 14th.*—The toast and beef-tea occasioned uneasiness and tightness in the epigastrium and both hypochondria, followed by dyspnœa and general restlessness, but no pain. The bowels were opened twice during the afternoon and evening. To-day there is tenderness over the right hypochondrium; febrile symptoms have again returned; pulse 132, rather feeble. *Six leeches to be applied over the tender part. To have enemata of brandy and beef-tea every two hours. To suspend the administration of food by the mouth. Dec. 15th.*—At the evening visit yesterday the febrile symptoms had greatly increased; thirst excessive; tongue dry and cracked; abdominal tenderness much relieved by the application of the leeches. To-day the febrile symptoms continue; face is flushed; and, on being interrogated, she states that she had a rigor and feeling of cold yesterday afternoon. On percussing the chest posteriorly, there is dulness over lower third of right lung, with double friction murmur and œgophonic vocal resonance; on the left side also slight dulness inferiorly, with crepitation during inspiration; pulse 132, feeble. The enemata, which have been continued at intervals, are no longer retained. *Intermittantur enemata. To have a little calf's-foot jelly by the mouth, alternated with a table-spoonful of clear brown soup every two hours.* ℞ *Solutionis tartratis antimonii,* ʒiij; *Potassæ acetatis,* ʒij; *Sp. ætheris nitrici,* ʒv; *aquæ,* ℥v. *M. Fiat mistura. A table-spoonful every four hours in two or three table-spoonfuls of water. Dec. 16th.*—Yesterday evening there was great exhaustion and feebleness; *the mixture was suspended; and a table-spoonful of wine was ordered every two hours.* To-day no tenderness over abdomen, but the dyspnœa and the physical thoracic signs continue; febrile symptoms still strongly marked; pulse 140, soft and vibrating; there is much flatulence. At her own request, she was allowed *fifteen grains of the bi-carbonate of soda. To continue the jelly and brown soup, with half an ounce of sherry every hour. Dec. 17th.*—Feels better to-day; urine loaded with lithates; flatulence has been relieved by the bi-carbonate of soda. *Dec. 18th.*—No change. *To have milk and lime-water to drink. Dec. 19th.*—Complains of increased pain in inferior portion of right side of chest, where there is still dulness and loud friction. Some dyspnœa. *Six leeches to be applied. Dec. 20th.*—Pain was relieved by the leeches, but the dyspnœa and physical signs on both sides of chest continue. *Blister*, 4 by 3, *to be applied over lower portion of right lung posteriorly. Dec. 21st.*—Has had copious sweating during the night; otherwise the same. *Dec. 22d.*—Much weaker; pulse 136, small and weak; lithates have disappeared from the urine; great dyspnœa. ℞ *Sp. Æth. Nit.* ℥ss; *Tinct. Colchici,* ʒij; *aquæ,* ℥v; *a table-spoonful every four hours. To have an enema of beef-tea and egg; and rice, with beef-tea, by the mouth. Dec. 23d.*—Is free from pain; general symptoms unchanged; pulse 124, weak; slight subsultus tendinum; appetite capricious; prefers arrow-root to rice. *Dec. 25th.*—Complains now of diarrhœa. *Habeat Enema c. Tr. opii, min.* xl. *Dec. 26th.*—Diarrhœa continues; early this morning took the following draught:—℞ *Sol. Mur. Morph. m.* xv; *Tinct. Catechu,* ʒss; *Syrup. Limonum,* ʒj *M.* No change in the febrile symptoms, dyspnœa, or the pulmonary physical signs; has no pain; pulse 124, weak; skin clammy; states that she felt very cold during the night. *Dec. 27th.*—Diarrhœa continues. *To have an enema of starch and opium. Dec. 28th.*—Diarrhœa has ceased; dyspnœa and febrile symptoms increased; no pain; face pale and anxious. *Dec. 29th.*—Evidently weaker; breathing laboured; pulse 140, weak and thready; countenance of a yellow waxy tinge. There was profuse sweating this morning; other symptoms unchanged. *Dec. 30th.*—She continued to sink, and died this morning at 3 A.M., death having been preceded by repeated vomiting of dirty brownish-green matter.

Sectio Cadaveris.—Thirty-three hours after death.

HEAD not examined.

THORAX.—Two drachms of clear serum in the pericardium; heart healthy; the right lung healthy, but its lower lobe and the diaphragm on that side were considerably pushed upwards by an abscess containing nearly a pint of pus, situated above the liver and below the diaphragm; the left lung also healthy, with the exception of a gangrenous ulcer, the size of a shilling, in the centre of the lower lobe inferiorly, where it rested on the diaphragm. This ulcer presented a brownish, broken up, sloughing surface, and was surrounded by red hepatization, occupying the pulmonary substance to about the extent of a hen's egg.

Abdomen.—On reflecting the integuments, a considerable quantity of pus escaped from the abscess above alluded to on the right side, immediately below the diaphragm and above the liver. This abscess contained nearly a pint of pus, and was situated in a circumscribed pouch formed by the diaphragm above, the liver below, the peritoneum anteriorly and externally, and false lymph of considerable tenacity internally. Lymph also glued these parts and the small curvature of the stomach together. On reflecting the integuments, the anterior wall of the abscess was removed, and so the pus escaped. The stomach, transverse colon, and coils of intestine in the superior third of the abdomen, were all glued together by bands and flakes of lymph, which, though of tolerable tenacity, were gelatinous in consistence, and could readily be torn through by the fingers. In the left hypochondrium there was a layer of this lymph half an inch in thickness, softened, purulent, and gangrenous in the centre, situated above the spleen, and communicating, by a sloughened opening, with the ulcer and hepatization in the lung formerly described. On cutting open the stomach, in the line of its large curvature, there flowed out a dirty, greenish-brown, grumous liquid, containing coagulated masses, apparently of milk, tinged of a dark-red colour by port wine. In the posterior part of the stomach, about its centre, was observed an oval ulcer, the size of a five-shilling piece, with smooth, thickened edges, and surrounded by puckered folds of the mucous membrane, which was otherwise healthy. The ulcer was adherent to the pancreas behind, which constituted its base; but the adhesions round its superior half were composed of the same gelatinous lymph as has been previously alluded to. On dissecting the ulcer from its attachments, it was seen to have completely perforated the coats of the stomach, although the opening behind, viewed on the serous surface, was not above the size of a shilling. On removing the intestines from the pelvis, flakes of purulent lymph were observed between several of their coils and on the serous membrane of the pelvic cavity. All the other organs healthy.

Commentary.—All the facts connected with this case were obtained with great accuracy, and left us in little doubt from the commencement that we had to treat a chronic ulcer of the stomach, which on the morning of the day she was admitted had so perforated the organ as to induce the violent pain she complained of. The peritonitis, which may have been induced by the perforation alone, was undoubtedly augmented by the brandy and water administered to rally her from the state of collapse into which she was thrown by the immediate effects of the accident. On entering the house also about five hours after she became ill, a stimulating and anodyne draught was administered by the clerk to rouse her from her depressed condition. As this was followed by no increase of local pain, but by improvement of the vital powers, we may fairly conclude that the practice, though highly questionable, was not productive of injury. Nothing, indeed, is more natural on the sudden occurrence of violent pain in the epigastric region with a feeling of syncope, than to have recourse to stimulants, for perforations of the stomach are rare occurrences, and it is not every one who at such a moment, even among the profession, has sufficient coolness and discrimination to detect the real nature of the disease. Hence, why so frequently these perforations are fatal, not from their own natural results, so much as from the stimulating remedies, which pass through the aperture into the abdominal cavity. Indeed, had not brandy and water been given in this instance, there is every reason to suppose that the perforation might not have occasioned much mischief, for it occurred early in the morning, before breakfast, and long after her evening meal, when the organ was consequently empty, and it is to be observed that such perforations have a great tendency to become re-closed by the rapid formation of fibrous lymph round their edges. In this case, however, extensive peritonitis was already occasioned when I first saw her, and the subsequent treatment was directed—1st, To prevent the introduction of further matters into the stomach; 2d, To rally her from collapse by stimulating and nutritive enemata; and 3d, To conduct the inflammation to a favourable termination by local fomentations and opiates largely administered in the form of enemata, and subsequently in pills by the mouth. This treatment was attended with apparent success, so that on the fifth day nourishment was cautiously administered by the mouth, and also with tolerable benefit. On the eighth day, however, rigors appeared, followed by fever, which was attributed to a pleurisy on the right side, where increased thoracic dulness was discovered inferiorly, with loud friction and œgophony. Circumscribed pneumonia evidently also existed on the left side, as indicated by crepitation. This formidable complication was attempted to be relieved by gentle salines, and topical bleeding by leeches. It was soon apparent, however, from the appearance of dyspnœa and other symptoms, that there was now little hope, and notwithstanding the liberal administration of stimulants, she sunk on the twenty-third day. Dissection exhibited exactly what was anticipated with regard to the stomach and peritoneum, but showed that the symptoms of the presumed pleurisy were owing to an abscess, which, by pushing up the diaphragm and occupying the lower portion of the thoracic space on the right side, gave rise to all the physical signs of pleuritis. On the left side there was limited pneumonia as was expected, but it communicated by a gangrenous ulcer in the diaphragm, with the lymph exuded above and around the spleen. The edges of the ulcer were firmly united all round to the pancreas, so that the patient undoubtedly died of the extensive peritonitis occasioned by the brandy and water administered.

CASE LVIII.*—*Chronic Ulceration of the Stomach—Perforation occasioned by a Fall (?)—Recovery.*

History.—Barbara Ferguson, servant, aged 51—admitted January 6, 1853. States that she enjoyed excellent health till about eight years ago, when she first began to complain of her stomach—suffering from pain of a cutting or grinding character, always worse after taking food. Her appetite has all along continued good, but she often experienced considerable thirst; has never had nausea or vomiting. She believes that she has been getting worse lately, but has had no distinct exacerbation. On January the 4th instant, stepping upon a chair, her foot slipped, and she fell with the stomach across the back of it. She was immediately seized with intense pain in the epigastrium, rapidly extending over the whole abdomen. She did not faint, and was still able to speak, but had to be carried to bed. The accident occurred about 9 P.M., three hours after she had taken any food, which had consisted of some coffee, with a few mouthfuls only of bread. She was immediately ordered a one-grain pill of opium, which was to be repeated every four hours. On the next day, as the acute pain still continued, four leeches were applied to the epigastrium, followed by warm fomentations. She has had nothing by the mouth except the opium pills, up to date of admission.

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* Reported by Mr. F. S. B. F. de Chaumont, Clinical Clerk.

SYMPTOMS ON ADMISSION.—On admission she appears very weak and nervous, and in a state of partial collapse; the countenance is sallow; pulse 100; weak; heart sounds normal; no headache, but a feeling of vertigo on attempting to rise or change her position; tongue clean, moist; no nausea or vomiting; appetite gone; considerable thirst; pain in epigastrium, which, with the whole abdomen, is excessively tender on pressure; she has had great dysuria and pain on micturition ever since the accident. All the other functions are normal; *ordered to have no food by the mouth but an enema of beef-tea, with the yolk of an egg immediately, to be followed in two hours by an opiate enema, with 40 minims of tincture of opium; to be kept quiet and not to get out of bed.*

PROGRESS OF THE CASE.—*January 7th.*—Was almost free from pain yesterday evening, and felt altogether much better, having slept a good deal during the afternoon. *The beef tea enema, with yolk of egg, has been repeated at intervals of four hours, and she had another opiate at* 4 A.M., after which she slept well. To-day she feels easier; pain, or rather tenderness, in epigastrium somewhat diminished; and considerable pressure may now be exerted without causing uneasiness. She has still thirst; tongue dry; very little inclination for food; pulse 100, soft. *Jan. 8th.*—Was considerably easier last night, and expressed a desire for some food; the pulse was of better strength, 90. To-day is still improving; complains of no pain when lying quiet, but still pain on pressure in epigastrium; she expresses fear and pain when other parts are touched, but not to the same extent; pulse 95, of moderate strength. *She has had the beef tea, etc., enemata as before, with an opiate enema every* 10 *or* 12 *hours—to have beef tea and milk by the mouth, in table-spoonfuls at a time, repeated every five minutes if the patient desires it. Jan. 9th.*—Felt rather uneasy after taking the beef-tea and milk, which occasioned a sense of "working" in the stomach. An opiate enema was ordered in about two hours, and in the evening she expressed herself as free from uneasiness, and rather refreshed from the beef-tea. To-day she feels not quite so well, and her general appearance is more depressed. She has continued the beef-tea, but has had an egg and beef-tea enema twice a-day in addition; pulse 88, of good strength; bowels have not been open since admission; *to have a warm water enema, with an ounce of castor oil, followed, if necessary, by an opiate one. Jan. 10th.*—Felt rather weak and exhausted after bowels were opened; the opiate enema was administered two hours afterwards, and she has felt better since; had some tea, with a little toast, by the mouth this morning; takes beef-tea for dinner, but cannot eat rice or any farinaceous food; no bad effects have followed taking food by the mouth; pulse 88, of good strength; little pain complained of, and she can now sustain considerable pressure on epigastrium without suffering.

Slept less last night than before; urine clear, sp. gr. 1020, contains phosphates. *Omit the enemata.* *Jan. 24th.*—Since the last report she has been doing well, and gradually gaining strength. Dismissed.

Commentary.—Many cases are on record, where evident perforations of the stomach have by judicious treatment been cured, and the one just narrated seems to me to be an instructive example of this favourable termination of the lesion. The symptoms at the commencement were very like those of Case LVI., except that they were induced by a blow on the epigastrium, instead of coming on after straining at stool. Violent pain, tenderness on pressure, and collapse were the immediate effects. Fortunately, I saw the patient immediately after the accident, and took care not to administer brandy, or stimulating draughts. A grain of opium in the form of pill was administered every four hours, quietude enjoined, and complete abstinence insisted on. Next day the local pain continued, and on the following morning I sent her to the Infirmary. Nourishment was administered by enemata, but on the fourth day was cautiously given by the mouth, and no untoward symptom arose. Since then she has been slowly recovering. Of course we have no positive evidence that there was a perforation in this case, although for eight years she has been subject to severe attacks of pain in the stomach, increased on taking food. But there had been no vomiting. It is possible that the blow may have been sufficiently strong in itself to induce the pain and subsequent symptoms, although, from all the inquiries I could make, it did not appear to be so. One of her fellow-servants indeed maintained that it must have been trifling. Wherever anatomical evidence fails, there must be more or less uncertainty hanging over the history of those cases which recover; but, taking all the circumstances into consideration, I cannot help thinking that had brandy and water been given in this as in the former instance, there is every chance that here also fatal peritonitis would have been occasioned.

From what I have observed of post-mortem examinations in the Royal Infirmary of Edinburgh, it does not appear to me that chronic ulcer of the stomach is a common disease there. Without having made any exact calculation, nothing positive can be said, but I do not think that it surpasses 3 per cent; whereas in the Copenhagen and some German hospitals, it is said to vary from 6 to 13 per cent.* This has been thought to be dependent on habits of intemperance and diet, although, if so, we might have anticipated that the habit of drinking raw whisky would have rendered it more common in Scotland. Its morbid anatomy was first admirably described and figured by Cruvelhier,* the ulcer being chronic, of circular or oval form, generally varying in size from a fourpenny to that of a crown piece, with an abrupt, slightly thickened margin as if it had been punched out, and an indurated smooth base. It may be shallow or deep, and frequently perforates all the coats of the stomach, in which case the external is larger than the internal aperture. There is a great tendency in the former to contract adhesions to neighbouring viscera, more especially the pancreas, immediately over which, in the posterior wall of the stomach, it is most commonly situated. If, on the other hand, it occurs in the anterior wall, it is more likely to induce perforation. The ulcer may heal at any period of its progress, when the cicatrix will vary in appearance, according to the amount of tissue previously lost. Sometimes there is a mere scar, at others a stellate puckering. Occasionally there is a dense thickening with rigid folds, causing contractions in one place, and pouches in another, and this contraction may even be circular, causing a stricture of the organ. Mineral deposits are now and then adherent to the cicatrix.

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* See an able Memoir on the subject by Dr. Brinton. London, 1857.

The three leading symptoms of chronic ulcer of the stomach are pain, increased on pressure, vomiting after taking food, and hæmatemesis. Of these, the last is the most important in a diagnostic point of view, because its presence renders certain, what would otherwise only be conjectural. The disease, however, may exist without as yet having so injured a blood-vessel as to occasion hemorrhage. Hence the symptoms of chronic dyspepsia, with vomiting after food and fixed pain, if long continued, should invariably give rise to the suspicion of an ulcer, and lead to an appropriate treatment.

The remedies I have found most efficacious, in simple chronic ulcer of the stomach, are quietude, careful regulation of the diet, bismuth and opium pills or powders, and sometimes warmth, at others cold applied locally. It may frequently be observed that the mere coming into a hospital and remaining quietly in bed has a favourable effect in modifying the distressing symptoms. I have also remarked that those patients who are always getting up and walking about suffer much more than those who remain in bed, especially at the commencement of the disease. Hence, repose in an easy position should be enjoined. The diet should consist of farinaceous pulpy substances, occasionally mixed with beef-tea, or milk, given in small quantities, frequently repeated. If the stomach will not tolerate them warm, they should be given cold. If, notwithstanding, vomiting continues, it will be best to suspend all nourishment for a day or two, and give nutritive enemata. As the patient gets better, the amount of solid food should be very cautiously increased. Thirst is a distressing symptom in such cases, and is best allayed by allowing ice to dissolve in the mouth slowly, or sipping, at intervals, milk and lime-water, mingled in equal proportions. The pain is alleviated best by bismuth and opium, combined in the form of pill or powder. Locally warmth, but more frequently pounded ice, mixed with salt in a bladder, placed over the part, will answer. Two or three leeches, or a counter-irritant, may succeed when everything else fails, and should be tried. Quietude and suspending all ingesta for a time, I believe to be the best remedies for hemorrhage, and where exhaustion from want of food exists, nutrient enemata, with wine, must be administered. When a perforation occurs, I have already pointed out the great importance of avoiding stimuli by the mouth (Cases LVII. LVIII.), and the practice which should be perseveringly followed, namely, opium, in the form of pill, quietude, avoidance of purgatives, and nourishing at first by enemata, and then cautiously by unirritating substances, administered in small quantities by the mouth.

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* Anat. Pathologique. Liv's. x. et xx.

CASE LIX.*—*Cancer of Stomach, Pancreas, and Mesenteric Glands—Cystic Atrophy of Right Kidney.*

HISTORY.—Thomas Gaffney, æt. 50, married, a labourer—admitted November 24, 1856. States that up to twelve months ago he was in good health, but since that time he has been troubled with pyrosis and occasional vomiting, with diminished appetite. Three months ago, feeling much pain in the epigastrium, he noticed that he had a tumour in that region. It was very sore, continued to increase in size, and became more and more painful. At present he is very emaciated, and suffers severe pain in whatever position he places himself.

SYMPTOMS ON ADMISSION.— Teeth and gums dry; tongue dry, with a longitudinal fissure down the centre. Thirst only occasionally felt. Has no appetite. Has no difficulty in swallowing; but complains of constant pain in the epigastrium. It is not distinctly increased on taking food. The food cannot be retained on his stomach, coming up in mouthfuls from an hour to an hour and a half after ingestion. The vomited matter is described as resembling in colour coffee grounds. On examining the epigastrium in the mesial line, two inches below the ensiform cartilage, and three inches above the umbilicus, there is felt a small tumour about the size of a walnut of an irregular margin superiorly. The convex surface looks outwards and downwards. It may be moved upwards and to the right, but not downwards or to the left. In left half of epigastrium, over a space of two square inches, there is dulness on percussion, and on palpation, a deep-seated strongly-resisting tumour is felt, with a distinct margin to the right side. It appears to pass upwards under the superior part of left hypochondrium, where percussion gives forth a comparatively dull resonance. Percussion elsewhere over abdomen, tympanitic. Over the hepatic organ and over the tumour there is great tenderness on percussion. Occasionally the tumour is felt more distinctly, and is then rough and nodulated. The chest is barrel-shaped. Percussion is unusually resonant. Respiration is feeble anteriorly and is harsh posteriorly, the expiratory murmur being prolonged. No dyspnœa. Sputum scanty. Precordial region unusually resonant on percussion. Transverse dulness, two and a quarter inches. Cardiac sounds healthy, but feeble. Apex of heart cannot be felt. Pulse small and weak, 68 per minute. Sleeps but little. Urine normal. *The diet is to be carefully regulated; small quantities of nutritive food and wine to be taken at frequent intervals. A mixture of snow and*

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* Reported by Mr. William Guy, Clinical Clerk.

salt put into a bladder is to be applied over the tumour. To take two of the following pills every night:—℞ *Morph. Acet.*, gr. iss; *Conserv. Rosar.*, gr. xij. *Fiat massa in pilulas sex dividenda.*

Progress of the Case.—*December* 1*st.*—The local application of cold has afforded him considerable relief, so much so that he does not like to be without it. He is unable to take a sufficient amount of aliment, and is gradually getting weaker. *Dec.* 4*th.*—The pills at night continue to lull his pain. His diet consists of strong beef-tea, three half pints per diem; bread and milk; milk and rice pudding; with six ounces of wine. Patient always vomits after eating, however little, and continues to sink. *Dec.* 5*th.*—Died at 10.30 A.M.

Sectio Cadaveris.—Twenty-eight hours after death.

Abdomen.—Permission could only be obtained to examine the abdomen. On opening the stomach it was seen to contain a considerable quantity of yellow pultaceous substance, being half digested food tinged with bile. The pyloric orifice was compressed by a mass of cancerous exudation, seated in the smaller curvature, and projecting into the stomach; this mass was about 5 inches in diameter, rounded at the margins; nodulated internally with two projecting portions, so situated as to act as valves in front of the pyloric orifice, through which a finger could be easily passed behind them. The thickness of this mass was in one place two inches, gradually diminishing towards the margins to half an inch. The tissue was friable, easily breaking down under the finger, but not yielding cancerous juice. The pancreas was generally healthy, but an inch of the duodenal extremity was involved in the cancerous tumour. The cardiac orifice, which was half an inch from the margin of the cancerous tumour formerly described, was quite healthy, as was the rest of the stomach not involved. Several mesenteric glands in the neighbourhood of the pancreas were enlarged, nodulated, and filled with cancerous exudation. Anteriorly the stomach was strongly adherent to a portion of the liver, which below, over the tumour described, felt hard and nodulated. In the position of the right kidney was a cyst, the size of the human head, containing yellow serum. Internally it presented a smooth serous surface, here and there interrupted by circles, and fragments of circles leading into pouches. Some of these openings were perfectly circular, with smooth abrupt margins, and were about the size of a fourpenny piece; others were about the size of half a crown or five shilling piece. Here and there, on the surface of the serous membrane, were corrugated indurated lines with black calcareous plates upon them, the result of cicatrizations. Externally the pouch was smooth, covered with shreds of cellular tissue; at its inferior portion was an induration, measuring two inches in length, and being cut into four, was found to consist of cortical renal substance about one-sixth of an inch in thickness. Immediately behind this renal substance was a cyst, communicating with one of the pouches previously described, about the size of half a crown. No trace of tubercular structure could anywhere be seen.

A portion of lung was also removed about two inches square; it was spongy throughout, but presented gelatinous-looking masses, about one-sixth of an inch in diameter, scattered through its substance. They could be squeezed and compressed between the fingers, but had a certain amount of firmness. On section they presented a smooth surface of grey colour.

Microscopic Examination.—The cancerous mass in the stomach presented cancer cells in all stages of formation, with granule cells here and there embedded in masses of molecular substance. The mesenteric and epigastric glands on being cut presented a fragile surface, from which a glutinous substance could readily be scraped. This contained, when examined microscopically, large cancer cells multiplying endogenously; here and there granule cells, with a few fibres and numerous molecules. The rounded masses in the lung were of the same structure.

CASE LX.*—*Colloid Cancer, with Perforating Ulcer of Stomach.—Peritonitis.*

HISTORY.—James Douglas, æt. 55, a porter—admitted September 15, 1854. About fourteen weeks ago, being previously quite healthy, he began to experience a burning pain in the epigastrium, more severe after taking food, and also a sensation as of a ball rising in his throat. For three weeks he continued to work, but gradually grew worse; eight weeks ago, he vomited, for two days, dark coloured matter like coffee grounds. Has since been troubled with pyrosis, has lost his appetite, and become weaker and thinner.

SYMPTOMS ON ADMISSION.—Is greatly emaciated. Tongue moist, slightly furred; appetite bad; no dysphagia; feels pain in the epigastric region constantly of a burning character, more severe after taking food; no vomiting, but has eructations of a thin watery fluid. The epigastrium feels hard on palpation; in the region of the umbilicus there is a distinct tumour stretching across the abdomen; moveable under the integument; not very tender to the touch. Bowels habitually costive. Has no cough. Pulse 56, weak. Urine not coagulable, of sp. gr. 1019. Other systems normal.

PROGRESS OF THE CASE.—*September 15th to October 9th.*—The patient has been treated by the administration of antacids, bismuth and magnesia; by the injection of nutritive enemata; by occasional opiates at night; by suitable aperients, and careful regulation of the diet. He has gained no strength; is indeed much weaker; at present he has a burning sensation along whole course of the œsophagus. *Oct. 13th.*—This morning experienced acute pain in the abdomen, which is now distended, and generally painful on pressure and deep inspiration. Pulse 84, pretty firm. *Eight leeches were applied to the abdomen, followed by warm fomentations, and opium in grain doses. Oct. 14th.*—Has had much vomiting, this morning, of dark coffee-coloured fluid; pulse is feeble, and extremities are cold. While eating his dinner to-day, he fell forward, and immediately expired.

Sectio Cadaveris.—Twenty-two hours after death.

Body very much emaciated.

THORAX.—Thoracic organs normal.

ABDOMEN.—On opening the abdomen a large quantity of dark coloured fluid was found, in which were suspended flakes of white lymph. To the inner surface of the peritoneum pieces of soft recent lymph were attached, but it was quite free of small round nodules. The stomach and the intestines were loosely glued to each other, and to the parietal peritoneum by soft lymph. The fingers alone were sufficient to separate the bowels. On examining attentively the anterior surface of the stomach two or three small perforations could be detected. The largest was nearly an inch long on the outer surface of the stomach, and corresponded to an ulceration about 2½ inches in extent internally. The pyloric half of the stomach was transformed into a large, intensely hard, glue-like mass, and was about the size of a cocoa nut, or two closed fists. On opening the stomach, the mucous membrane, towards the cardiac extremity, was perfectly sound, but at the pyloric end it had undergone ulceration at several points, especially near the smaller curvature and the pylorus.

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* Reported by Mr. Robert Rhind, Clinical Clerk.

The pyloric orifice was of sufficient diameter to admit easily the little finger. The pancreas, liver, and surrounding organs were healthy. The texture of the growth was as hard as cartilage, and creaked under the knife, but on section presented the usual characters of colloid cancer. (See p. 142.) The mucous membrane of the intestines was perfectly healthy. The other abdominal organs were normal.

Microscopic Examination.—The colloid cancer presented the characteristic structure described and figured p. 142.

Commentary.—An indurated swelling in the epigastric region, pain and vomiting after food, are the usual symptoms of cancer in the stomach. All these were present in the two cases just noticed. There was, besides, hæmatemesis, indicating ulceration in Case LIX., and, in addition, sudden pain, with peritonitis, in Case LX., pointing out the occurrence of perforation. The vomiting did not appear so soon in the last as in the first case, and it will be noticed that in it the pyloric constriction was not great. On the other hand, ulceration was more extensive with pyrosis, and led to perforation with fatal peritonitis. The atrophy of the right kidney, which was converted into a fibrous sac, had not apparently in Gaffney produced any complaint whatever during life. All the symptoms observed in this man, with the exception of hæmatemesis, may be produced by a tumour outside the stomach pressing on the organ, as well as by disease of the organ itself, and nothing is more difficult (if indeed it be ever possible) than to diagnose those conditions from each other under such circumstances, which, however, are rare. (See case of Cancerous Liver, p. 476.)

In many cases the lesion hitherto described as scirrhus of the pylorus or stomach seems to be a simple hypertrophy of the muscular and fibrous coats, which may or may not be associated with cancer of the neighbouring glands. A simple stricture of the pylorus may in this way occur, producing more or less thickening of the organ from the necessity of increased action to overcome the obstruction, or in maintaining chronic vomiting, such as occurs in the intestines, bladder, or other hollow viscera. (See Figs. 139 to 141, p. 160). I have recorded four cases of this kind in my work on, " Cancerous and Cancroid Growths." (Edinburgh, 1848, p. 46, *et seq.*) In all such cases it is observable that the same emaciation and cachectic appearances are present as in instances of undoubted cancer—a circumstance which is attributable to the impeded nutrition of the body rather than to a supposed cancerous diathesis. On this account I have long ceased to place any confidence in the so-called " cachectic appearance" as diagnostic of cancer, attributing it either to imperfect nutrition, or to wearing down from excessive pain. It is often present in many other forms of morbid growth, and frequently absent when the disease has been proved to be cancerous by a microscopic examination.

Of all the forms of cancerous disease, that of the stomach is perhaps the most distressing, cutting off as it does the supply through which the nourishment enters the system, and inducing (in addition to the wearing-down pain), loss of sleep, loss of blood, and more or less constant vomiting.

Still it is our duty to relieve and support the system; and to this end opiates in large doses, nutritive enemata, careful regulation of the diet, and ice allowed to dissolve in the mouth, are our best remedies. A local frigorific mixture, as recommended by Dr. J. Arnott, and the application of a few leeches to the epigastrium, are also occasionally beneficial. In Case LIX. the former was of marked service.

For a knowledge of the histological changes which occur in various disorders of the stomach we are indebted to Dr. Handfield Jones, who has described and figured the appearances presented by the follicles, their contained cells, and other minute structures under a variety of circumstances. There may be hypertrophy and atrophy of the solitary glands; atrophy of the glandular tubes; fatty degeneration; wasting and black discoloration of their epithelial contents; fibroid thickening, etc. Dr. Jones has even laid the foundation for a clinical history of these lesions, although the observations are as yet far too few to enable us to connect them with diagnosis and treatment at the bedside. For what is known on this subject, I must refer to Dr. Jones' work,* hoping that before long his patient and admirable researches may be extended by clinical histologists, and ultimately lead to a more exact knowledge of the dyspeptic and organic diseases of this important organ.

DISEASES OF THE LIVER.

Notwithstanding the obscurity which still rests upon the functions of the liver, the progress of histological pathology has tended to make us better acquainted with the minute changes which occur in many diseases of the organ. The nature of fatty enlargement, of cirrhosis, and of the disintegration of cell-texture following obstruction of the bile-ducts, is now understood. Doubtless much research is still necessary, and more especially a careful comparison of the structural changes observed in the liver after death, with the clinical history and observation of symptoms during life, is now what is greatly desired to advance our knowledge of hepatic diseases. This, however, can scarcely be expected, until medical men, and especially such as practise in the East, become efficient histologists. It is the therapeutics applicable to these diseases, however, and a correct appreciation of the class of remedies called cholagogues, which in the present state of medicine so much requires to be determined. Such an investigation necessitates physiological, histological, and chemical knowledge, added to good powers of clinical observation. But of all the subjects of research now open to the young investigator, I know of none in which patience and exactitude, based on a scientific rather than an empirical system of inquiry, is likely to yield more useful results.

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* Pathol. and Clinical Observations respecting Morbid conditions of the Stomach. London, 1845.

CASE LXI.*—*Acute Congestion of the Liver—Hepatitis?—Recovery.*

HISTORY.—Thomas Russell, æt. 38, labourer at a gas-work—admitted January 26th, 1855. States that about three weeks ago, after indulging freely in the use of ardent spirits, he experienced general shivering and pain in the right hypochondrium, with tinnitus and a sense of faintness. Subsequently he felt pain in the right shoulder, and at length was obliged to leave off work. His comrades, who went home with him, told him that he looked yellow in the face. At night he became very hot. He returned to his work on the following day, and continued at his employment for a fortnight, but was very weak, and suffered much from the pain in his side and in the shoulder. Since then he has been confined to bed, under medical care, applying counter-irritants locally, and taking pills which have made his mouth sore.

SYMPTOMS ON ADMISSION.—On admission, he complains of pain in the right hypochondrium and right shoulder, in the former of which situations it is permanent and increased by pressure, while in the latter it is only occasional. The tongue is covered with a moist, white fur; the breath has a mercurial fœtor; the gums are painful; appetite good. Bowels open. Pressure and percussion over the liver painful. Vertical hepatic dulness 4½ inches. Pulse 72, soft. Sleeps little in consequence of the pain. Urine normal; no jaundice. Other functions well performed. *To apply six leeches to the right hypochondrium, and the parts afterwards to be fomented. To take two compound rhubarb pills every night.*

PROGRESS OF THE CASE.—*February 1st.*—The leeches and fomentations have in no way benefited the pain, which to-day is as severe as on admission. Bowels still open. Stools darker than formerly, but healthy. *Feb. 3d.*—Since last report all pain has left him; he declares himself to be well, and at his own request was discharged.

CASE LXII.†—*Acute Jaundice—Albuminuria—Recovery.*

HISTORY.—Walter Halliday, æt. 51, tailor—admitted July 6th, 1857. States that he has generally been a temperate man, although, occasionally, he has taken spirits moderately. On the 1st of this month, when working below an open window, he was suddenly seized with rigors, followed by great thirst, heat of skin, and headache. Next morning he went to work as usual, but was obliged to desist in the middle of the day, and go home. The rigors have returned occasionally ever since, and he has experienced obscure pain in the lumbar region. The skin became jaundiced on the second day of his illness, and has been increasing in intensity since. He has also occasionally vomited.

SYMPTOMS ON ADMISSION.—The tongue is moist and covered with a whitish fur. No difficulty in or pain after, taking food. No tenderness or pain in abdomen; but feels a pain in the lumbar region, which sometimes darts round the right side towards the umbilicus. Appetite impaired. Bowels costive. Vertical dulness of liver on percussion 4 inches. The skin over the whole body is of a deep yellow tint, dotted with spots of purpura the size of pin heads; but is cool and moist. The urine is deep coloured, like Madeira wine. It is very albuminous on the addition of heat, and contains a large quantity of bile. Pulse 88, small and weak. Other organs healthy. ℞ *Pot. Acet.* ʒij ; *Sp. Æther. Nit.* ℥ss ; *Aquæ*, ℥vi *M. One ounce to be taken every three hours. July 8th.*—Bowels were freely opened yesterday in consequence of a *Calomel and Jalap powder* which was given. Stools were fluid and of a dark brown colour.

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* Reported by Mr. W. J. Marshall, Clinical Clerk.

† Reported by Mr. W. H. Davies, Clinical Clerk.

Progress of the Case.—*July 9th.*—On microscopic examination of the urine, it was seen to contain numerous casts, with delicate walls, having in their interior large epithelial cells. Passes more urine than formerly. *To have pulv. Doveri*, gr. x *at bed time, followed by a diaphoretic draught. Two compound rhubarb pills to be taken every night. July 12th.*—The urine and skin are now of a healthy colour. The pulse, however, remains low, and the patient weak and languid. Nutrients, tonics, and wine, with gentle exercise, were now given, under which he became thoroughly well, and was discharged August 3d.

Commentary.—These two cases are examples of the slighter forms of hepatic disease, although what that disease is it becomes no easy matter to determine. In the first case we have pain, increased on pressure in the right hypochondrium, and in the right shoulder, ushered in by rigor and febrile symptoms. On percussion, the liver is found to be slightly enlarged. After coming into the house the disease subsides in a few days. The leeches and fomentations did not seem to alleviate the pain, but the purgative produced a more healthy intestinal discharge. In the second case there was little local pain, but evidently a something which had caused interference with the secretion of bile. The skin was deeply jaundiced, the stools of a dark clay or leaden colour, and the urine loaded. This condition was also ushered in with rigors and febrile symptoms. Ptyalism was produced before he entered the house, without occasioning the slightest benefit. On the contrary the disease increased. But under the action of diuretics and diaphoretics, to favour secretion of the bile already absorbed, as well as of mercurial purgatives to rouse the duodenum and upper parts of the alimentary canal to a more healthy action, he rapidly recovered. Whether the disorder in these cases was congestive or inflammatory, or both, cannot be determined. Whatever the lesion, it so operated in the one case as to induce great pain, and in the other to obstruct the gall ducts and occasion jaundice.

Case LXIII.*—*Impaction of a Gall-Stone in the Common Bile-Duct—Jaundice—Death.*

History.—Mary Duncan, æt. 36, married, admitted November 24, 1851. She has lived in India some time, and returned only a few months since. Three weeks ago, when recovering from a severe attack of lumbago, she experienced great pain in the epigastric and right hypochondriac regions. This was ushered in by rigors and feverishness, and lasted three or four days. Its severity then diminished; but jaundice appeared, which has since become more intense.

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* Reported by Mr. J. L. Brown, Clinical Clerk.

Symptoms on Admission.—On admission, the whole integumentary surface presents a deep yellow colour. Pulse 100, full. The tongue is dry, with a dark-brown coat. There is a disagreeable taste in the mouth, impairment of appetite, but no nausea or sickness. The liver on percussion presents the normal dulness of four inches on the right side. Pressure in the neighbourhood of the gall bladder elicits pain, and there is permanent soreness diffused over the anterior portion of the liver and epigastric region. The pain is not spasmodic in its character, nor more severe at one time than at another. The bowels are generally costive ; skin hot and dry, urine like porter, staining linen yellow, and becoming green and then red on the addition of nitric acid. The abdomen is enlarged. She has had a child previously, and says she is now six or seven months pregnant. The treatment consisted of purgatives (*Pil. Rhei. comp.*) ; leeches and fomentations to the tender spot over the liver, and diuretics of acetate of potass and *sp. æther. nit.*

Progress of the Case.—*December 3d.*—The bowels have been kept open by purgatives, and the stools have been well coloured with bile. Leeches have been applied twice, and the hepatic pain has been much relieved. She has also been taking small doses of tartrate of antimony, and muriate of morphia. The skin, however, continues dry, and is now more deeply tinged yellow than on her admission. The urine also is still loaded with bile. To-day vomiting came on, and she rejects her food and medicine. The lips and teeth are covered with sordes, and she complains of great languor and depression. *Diuretics to be continued; a blister to the right hypochondriac region; and a powder, containing four grains of calomel and one-third of a grain of opium, to be taken every hour for six doses.* The mercury produced no physiological action, although continued in smaller doses and at longer intervals for several days, assisted by mercurial frictions over the right hypochondrium. *Dec. 11th.*—There was slight diarrhœa, which was checked by an aromatic cretaceous mixture. Mercurials were suspended. On the 13*th* she was evidently worse ; the skin assumed a greenish hue ; she is very feeble, and passes her stools in bed ; pulse 120, small. On the 15*th*, the skin assumed a tawny colour ; the stools are passed in bed, are green, of a dark colour, and of a very offensive cadaveric smell ; great prostration of strength ; urine still loaded with bile ; low delirium at night. Died on the 18*th*.

Sectio Cadaveris.—Thirty hours after death.

Thorax.—Thoracic organs healthy.

Abdomen.—On opening the abdomen, bands of recently-exuded lymph are found firmly uniting together the peritoneal surfaces of the gall-bladder, anterior margin of the liver, and a portion of the omentum, over an extent the size of the palm of the hand. In separating these adhesions, the gall-bladder and omentum were found so firmly united, that an aperture was formed in the former the size of a pea, through which a quantity of dark-green bile escaped. The liver was of its normal size, and presented externally a dark olive-green colour. On cutting into its substance, the gall ducts were everywhere dilated and thickened. Some were distended into elongated cavities, above half an inch in caliber, and they were all filled with thick dark-green bile. The tissue of the liver throughout was unusually soft, readily breaking down under the fingers, and uniformly of the same olive-green colour as the external surface. In the common bile-duct, about half an inch from its duodenal extremity, a hard light-yellow gall-stone, the size of a small hazel-nut, was firmly impacted, the duct both above and below being somewhat thickened and dilated. No other gall-stones could be anywhere discovered. The uterus and rectum were adherent, and in separating them about a tea-spoonful of yellow pus escaped. The vagina was shortened and constricted about two inches from the vulva, so as scarcely to admit a common quill. About an inch in the vagina, on its inferior wall, was a round aperture, the size of a shilling-piece, and surrounded by ragged edges, which communicated with the rectum. And on the superior wall of the vagina, about half an inch from the clitoris, was another rounded opening, about the size of a sixpenny-piece, into which the point of the little finger could be passed and pushed into the bladder. The natural meatus urinarius was occluded.

Microscopic Examination.—On crushing a small piece of the liver between glasses, and examining it under a power of 250 diameters linear, it was found to consist of a multitude of fatty molecules and granules, with larger globules of loose oil. Many of the cells seemed to be broken down and disintegrated, but such as were entire were more or less distended with bile pigment.—Fig. 376.

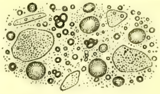
Fig. 376.

Commentary. The symptoms present in this case on admission were indicative of obstruction in the common bile-duct connected with some inflammatory action going on in the liver or its neighbourhood, as indicated by the local pain, the rigors, and fever. Hence the topical application of leeches, and afterwards warm fomentations, were ordered. As the blood and urine were evidently loaded with bile, diuretics and purgatives were also given to assist the excretion of that product. These remedies proving of no avail, and the constitutional symptoms increasing, mercury, conjoined with opium, was actively administered, but failed to produce its physiological or any useful therapeutical result. After death, peritonitis surrounding the gall-bladder and common duct was discovered; but she evidently died from the system being poisoned from the absorption of bile, the excretion of which was prevented by the firm impaction of a calculus in the common bile duct. The benefit of mercury in such cases, though strongly recommended as a means of altering the constitution of the bile, appears to me very doubtful; for, supposing it to possess the effect ascribed to it, and to act as an alterative and cholagogue, its action in obstruction of the gall-ducts must be to distend them still further, and thus increase the pressure on the hepatic cells, and consequently the disintegration of the hepatic texture. Most of the examining class were in favour of the trial of mercury in this case; and considering how uniformly it is recommended by experienced practitioners, I did not think it right to deprive the patient of any chance which might arise from the use of this popular drug. At the time, I expressed my want of confidence in its virtues, an opinion which the progress of the case fully justified. In the present state of science and art of medicine, there is no one point in therapeutics which so urgently requires thorough reinvestigation as the real value of the medical properties attributed to mercury.

The effect of the long-continued over-distension of the gall-ducts on the liver, was a partial disintegration of its cell elements, and an accumulation of bile in such of the cells as remained perfect. This

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Fig. 376. Disintegration of the hepatic structure following obstruction of the biliary ducts. 250 *diam.*

lesion is remarkably well described by Dr. Budd, in the third chapter of his work on the liver, when treating of fatal jaundice. It admits of question, how far this destruction of the hepatic cells may not, by impeding the secreting power of the organ, at length induce that condition described by Dr. Alison, where the biliary principles are not eliminated. It must, I think, be certain that jaundice, produced primarily, as in the present case, by a mechanical obstruction, must be kept up by the altered condition of the cell-structure afterwards induced.

This case was instructive to all who observed it, with regard to a supposed pregnancy she laboured under. The abdomen was certainly somewhat prominent; but the investigation of the existence of this state was never gone into, for the simple reason, that it in no way affected the diagnosis or treatment. When the woman was dying, however, the husband applied to me, with a view of ascertaining whether it might not be possible to save the child. On this point I requested the opinion of Dr. Simpson, who, on examining the woman, declared her not to be pregnant. This circumstance then, is an illustration of how women who have previously had children may be deceived as to the existence of a subsequent pregnancy, and how important it is for the practitioner, as a general rule, to satisfy himself of the reality or falsity of such a state in all cases. When formerly delivered in India, she said instruments were employed, and that she sustained some injury. This account is rendered highly probable by the existence of the recto-vaginal and urethro-vaginal fistulæ, and the remarkable vaginal stricture, found after death.

CASE LXIV.*—*Jaundice—Compression of the Ductus Communis Choledicus from a Cancerous Tumour, composed of Epigastric and Lumbar Glands —Occlusion of Cystic Duct—Enlargement of Gall Bladder—Cancer of the Pancreas—Biliary Congestion of the Liver—Cancerous Exudation into various organs—Slight Leucocythemia.*

HISTORY.—William Dodds, æt. 23, ploughman—admitted December 8th, 1854. He states that four weeks ago he was seized with pain in the lower part of the abdomen, accompanied by unusual costiveness. Some days afterwards he commenced to vomit his food a few hours after he had taken it. The vomiting continued for a fortnight, and then suddenly ceased. But it returned about four days ago as before, and has continued up to the time of admission.

SYMPTOMS ON ADMISSION.—The tongue is loaded with a thick white coat, but moist. Appetite bad. After taking food he has a feeling of great load and distension in his stomach. No flatulence, but has frequent eructations of a watery fluid, which is neither acid nor of disagreeable taste. Usually vomits it about four o'clock A. M., and for some time afterwards experiences considerable relief; has constant severe pain and considerable tenderness over the epigastrium. A tumour can be felt towards the pyloric end of the stomach, of a rounded form. It measures two and a half inches vertically, its upper and lower margins being distinctly tangible. Its lateral margins, however, cannot be determined. The hepatic dulness in the right hypochondrium was normal. All the other functions are healthy. *Diet to be carefully regulated.*

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* Reported by Mr. Robert Rhind, Clinical Clerk.

Progress of the Case.—*December 10th.*—Has been much better since admission, not having vomited till this morning at five o'clock. He then brought up a large quantity of brownish pultaceous matter, which, on microscopic observation, was found to consist of half-digested muscular fibres, starch and oil globules, and epithelial cells. Has considerable pain and tenderness in the epigastrium. *Eight leeches to be applied, followed by warm fomentations. Dec. 18th.*—There have been remissions in the epigastric pain, which, however, still continues. The vomiting also has not been permanent, having been suspended for two days by eating ice, and again on the 16th, by a morphia draught. The constipation has been relieved by domestic enemata. It was observed to day, for the first time, that the skin has a decided though very slight yellow tinge. *Dec. 23d.*—Since last report has experienced great pain at times in the abdomen generally, for which he was ordered a draught at night with *Tr. Cannabis Ind.;* ʒss. *Six more leeches were also applied on the 20th,* but without lessening his sufferings. There has been considerable fever with thirst and loss of appetite. *Iced lemonade for drink, and warm fomentations to the abdomen* give most relief. Yesterday the jaundice was decidedly more pronounced, and has increased still more to-day. There has latterly been constant vomiting, shortly after taking food. He is more emaciated, and the tumour formerly alluded to can now be felt hard and nodulated through the integuments. The stools are of a clay colour, and the urine loaded with bile, so as to resemble porter. Pulse 120, very weak. ℞ *Pil. Opii.* vj. *One to be taken immediately, and repeated in four hours if there be no alleviation of the pain. To have wine* ℥iv. *daily, and ice to dissolve in the mouth. Continue the warm fomentations to the abdomen, and to inject slowly* ℥iv *of strong beef tea into the rectum.* From this time he continued sinking. The skin assumed a greenish tinge. On the 24th he vomited blood, and passed black tarry matter by stool. Brandy and stimulants were freely administered, but he died Dec. 26th.

Sectio Cadaveris.—Fifty-one hours after death.

The body considerably emaciated. The whole surface and all the tissues, including the cartilages, were stained of a greenish-yellow colour.

Thorax.—Both lungs were emphysematous anteriorly, especially the left. Posteriorly they were engorged, and on section were œdematous, with scattered nodules of cancerous matter in their substance, of cheesy consistence, but occasionally very soft, and varying in size from a pepper-corn to that of a small hazel-nut. A continuous layer of cancerous matter also here and there surrounded the bronchial tubes. From the universal predominance of bile-pigment, these cancerous masses closely resembled to the eye tubercular matter. Immediately under the upper part of the sternum, and over the ascending aorta, was a mass of lymphatic glands, about three inches long and two inches thick, of a fleshy colour and pulpy consistence, easily breaking down under the finger, and infiltrated here and there with a yellowish-white cheesy deposit, exactly resembling tubercle. The bronchial glands at the root of the lungs were greatly enlarged, and presented similar appearance. The heart was healthy. The ventricles contained semi-coagulated blood, the veins black fluid blood.

Abdomen.—In the cavity of the peritoneum there was about 8 oz. of dark-brown clear serum. The liver weighed 3 lbs. 12 oz., was of a light olive-green colour, approaching to brown, soft in texture, and on section was seen to contain a few whitish-yellow masses, varying in size from a millet-seed to that of a small pea, of tolerably firm consistence. The gall-bladder projected about an inch and a half below the lower margin of the liver. It was considerably enlarged and distended with thick black bile. The cystic duct was completely closed a little above its junction with the hepatic, which was quite free. The caliber of the common duct was much diminished ; and although a probe could be pushed through it, it was evidently compressed by the tumour to be described immediately. The spleen weighed 5 oz., and was healthy, with the exception of a cancerous mass in its centre, about the size of a coffee-bean, similar to those in the lung. Surrounding the pyloric end of the stomach, and projecting from below the liver towards the left side, was an agglomerated, indurated, and nodulated mass of enlarged and cancerous lymphatic glands, of the size and form of a cocoa-nut. This was the tumour which, during the life of the individual, was felt in the epigastrium. It pressed upon and completely occluded the ductus communis choledicus. The aorta passed through the left third of this mass, and was so compressed as scarcely to admit the little finger. On section, this mass presented very much the appearance of some specimens of pudding-stone, consisting of rounded or oval yellowish-white masses, varying in diameter from ¼ to 1½ inches, and united together by highly congested areolar tissue, of a deep purple colour, with here and there extravasations of blood in its substance. The affected glands were friable and easily crushed between the fingers, but yielded no juice on pressure. The mesenteric, mesocolic, and lumbar glands generally were similarly diseased. The right extremity of the pancreas was converted into a firm mass by cancerous exudation, and closely connected to the tumour just described, of which it formed an integral part. On opening the stomach, it was seen to contain a quantity of tenacious, brown, glairy mucus, closely coherent to the mucous membrane. Its walls at the pylorus were found thickened; and from this point the thickening gradually diminished, until it ceased at a convex margin, somewhat irregularly nodulated, and elevated above the rest of the mucous surface. The diseased portion occupied about one-third of the area of the organ. The mucous surface covering it was of a dirty-white colour, and was ulcerated at one point with softened ragged edges over a space the size of a shilling-piece. The healthy two-thirds of the mucous surface was of bright rose-pink colour, from vascular congestion. The cut edge of the pylorus was a quarter of an inch thick, dependent on hypertrophy of the muscular coat to the extent of one-sixth of an inch, and of an infiltration of firm whitish exudation, in the submucous areolar tissue. The intestines, kidneys, and other organs, were healthy.

MICROSCOPIC EXAMINATION.—The whitish-yellow masses in the lungs were principally composed of molecular matter, but with numerous delicate nucleated cells apparently forming. In the bronchial glands, the whitish-yellow matter was composed of a few cancer cells only, evidently in a state of disintegration, associated with multitudes of fatty molecules and granules. The fluid squeezed from the fleshy and pulpy matter in the same glands contained, 1st, numerous round and oval nucleated cells, about one-thousandth of an inch in diameter ; 2d, many granule cells of varying size ; 3d, multitudes of gland nuclei ; 4th, blood corpuscles ; 5th, a large quantity of molecular matter. The pulp of the epigastric glands contained, 1st, large cancer cells, some containing three included cells ; 2d, a very few granule cells ; 3d, numerous molecules. The blood contained a decided increase of colourless corpuscles. The cells of the liver contained a quantity of biliary matter, giving them, under the microscope, a bright yellow colour.

Commentary.—The nature of this case was tolerably evident from the first ; the epigastric tumour, pain, and vomiting after taking food, indicating obstruction of the pylorus in consequence of a cancerous growth. Later, when jaundice appeared, it became clear that the common duct was obstructed. Treatment could of course only be palliative. On dissection, it was singular to observe the resemblance which the cancerous masses in the lungs and in the glands bore to tubercle. Some persons who were present, indeed, judging from the youth of the patient, their friable consistence and yellow colour, maintained that the glands were scrofulous; and it would have been difficult to undeceive them had it not been for the microscope. All the tissues were tinged of a deep yellow, and the hepatic cells were gorged with bile, so that the absorption of this excretion into the blood must have been very great. The insensible manner in which so much cancerous matter must have developed itself is worthy of observation, as it was only four weeks before admission that he experienced any inconvenience. Then came on the effects of obstruction, first, of the pylorus, and, secondly, of the common duct—from the combined influence of which he died.

CASE LXV.*—*Jaundice—Cancerous Tumour of the Pancreas, comprising the Ductus Communis Choledicus—Dilatation of the Gall-bladder, and passage of Gall-stones into the Gall-bladder—Cancer of the Liver and Kidneys.*

HISTORY.—John M'Donald, æt. 50, tailor, admitted November 29, 1853. Four weeks ago he was seized with a gnawing pain in the epigastrium. On the 13th he was over-worked, and went home much exhausted. On the following day, there was drowsiness, loss of appetite, and anorexia. On the 27th, the skin was slightly tinged yellow. He applied at one of the dispensaries, and was then suffering from intense grinding pain in the right hypochondrium. One of the clinical students who saw him there advised him to come into the Infirmary.

SYMPTOMS ON ADMISSION.—He has no pain, no difficulty in taking food, though it excites nausea. Tongue slightly furred; moist. No appetite. Considerable thirst. Vertical dulness of liver is 3¾ inches. No abdominal tenderness. No tumour to be felt in epigastrium. Bowels constipated. Stools of a dark green colour; but he says they were white when the attack came on. Urine is of a dark brown colour, like weak porter, from the pressure of bile; unaffected by heat. Pulse 60, regular. Skin of a deep yellow colour. Other organs and functions normal. ℞ *Pil. Hydrarg.; Pil. Rhœi.* c. āā ʒss. *M. et divide in pil.* xii. *Two to be taken every night.*

PROGRESS OF THE CASE.—*December 3d.*—The stools are now of a lead colour. *To have* gr. v. *of Pil. Hydrarg., and of Ext. Taraxaci every night. Dec.* 10*th.*—Complains of acute grinding pain in the region of the liver. Bowels not been open for some days. Skin of a deeper yellow. *To have* gr. v. *of Pil. Rhœi.* c. *in addition to the others. Dec.* 12*th.*—Had an assafœtida enema yesterday. The bowels have been well opened; pain much relieved. Stools still of a lead colour. *Omittant Pil.* ℞ *Pil. Rhœi.*, c. ʒj; *Calomel,* ℈j; *Olei Cinnamomi,* gr. iv. M. *et divide in pil.* xij. *Two to be taken every night. Dec.* 14*th.*—Is now free from pain, but feels very weak. Stools of a dark green colour. Otherwise the same. Cannot take food. ℞ *Liq. Potassæ,* ʒij; *Sp. Æther. Nit.,* ʒss; *Infus. Gentian.* c., ℥ v. M. *Two table*

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* Reported by Mr. Almeric Seymour, Clinical Clerk.

spoonfuls to be taken three times a day. Dec. 17th.—Much weaker. Takes no nourishment. Skin of a dark green tint. Tongue dry, and covered with a dark brown crust. Bowels open. Stools of a dark leaden tint. Pulse 120, very weak. To have ℥vj of wine. *Dec. 19th.*—Whisky has been liberally administered; but he continued to sink, and died at two o'clock A.M.

Sectio Cadaveris.—Thirty-four hours after death.

Extreme jaundiced appearance of the whole body, and yellowness of all the tissues.

THORAX.—With the exception of slight emphysema of the lungs, all the thoracic organs were healthy.

ABDOMEN.—On opening the duodenum, there was seen at the point where the common duct enters it, a tumour bulging inwards, and compressing the duct. The growth was the size of a walnut, and presented all the characters of scirrhus. It was formed in the right extremity of the pancreas; and the rest of the organ was indurated, and contained several small cysts filled with a gelatinous fluid. The portion of the common duct which passed through the tumour was an inch and a half long, and barely admitted a small probe. Behind the constriction, the common, cystic, and hepatic ducts were greatly enlarged, the common duct having a caliber nearly equal to the size of the thumb. The gall-bladder was much enlarged, and distended with dark-coloured bile. It contained two small gall-stones of bile pigment, but none could be found in the ducts. The liver weighed 3 lbs. 9 oz., was of a green colour, with the centres of the lobules congested.. The bile-ducts were everywhere dilated throughout its substance. Scattered throughout the liver were white cancerous masses, varying in size from a pea to that of a hazel-nut. Similar small cancerous masses existed in the cortical substance of the kidneys. On opening the intestines, a considerable quantity of black blood was found mingled with the fœculent matter, both in the small and large intestines. Other organs healthy.

MICROSCOPIC EXAMINATION.—The cancerous masses in the pancreas, and liver, and kidneys, contained numerous characteristic cells. The hepatic cells were loaded with yellow bile, which became of a cherry-red colour on the application of Pettenkofer's test. They contained no fat.

Commentary.—It appeared, from careful examination of this man's case, that he had suffered from two attacks of grinding pain in the right hypochondrium, such as are commonly felt during the passage of gall-stones. After death, two biliary calculi were found in the gall-bladder, having all the appearance of those which are usually formed in the liver. It is almost certain, therefore, that the painful attacks were coincident with the passage of these calculi from the liver to the gall-bladder, as their escape into the intestines was prevented by the constriction of the common duct, by the cancerous mass in the pancreas.

Since the researches of Bernard as to the functions of the pancreas were made known, I have carefully sought, in a great number of cases, for the passage of fatty matter in the alvine evacuations, but in vain. In several instances of jaundice, such as the present, I have found the head of the pancreas diseased; but in none of them did the stools present the characters described in the cases of Bright, Lloyd, Elliotson, and others. It is true that in this case the common duct was not absolutely obliterated, but it appeared to me that the pancreatic duct was so involved in the tumour, that its fluid secretion was incapable of passing. But as no special anatomical investigation was made in reference to this point, we are not entitled to suppose that the supply of pancreatic juice was entirely cut off. In other cases, however, where the common duct has been obstructed (Case LXIII.), or where, from disease of the head of the pancreas, the pancreatic duct has been obliterated (Cases LIX. and LXIV.), there has been no proof whatever that the fatty elements of the food have not been emulsionized. Such facts indicate that the function attributed by Bernard to the pancreas must also be performed, under certain circumstances, by the alimentary canal alone, independent of that organ.

CASE LXVI.*—*Enlargement of the Liver—Ascites—Albuminuria—Recovery.*

HISTORY.—David Harper, æt. 30, painter—admitted into the clinical ward, February 18th, 1852. Four months ago, was seized with diarrhœa and vomiting, which have continued more or less ever since. The liver was first observed to be enlarged in the beginning of December last, and it has gradually increased in size up to the present time. He has taken numerous remedies to check the diarrhœa and vomiting, but with little effect.

SYMPTOMS ON ADMISSION.—On admission, the liver is found to extend from one inch below the right nipple above to within an inch and a half of the anterior superior space of the ilium below—a depth of nine inches. From this point its margin could be felt ascending obliquely upwards to the most depending portion of the ninth rib on the left side, crossing about an inch above the umbilicus. There is distinct fluctuation to be felt throughout the rest of the abdomen, indicating ascites. In the right lumbar region the enlarged liver is tender on pressure. The abdomen measures 32½ inches in circumference at its widest part. Spleen of normal size. Tongue moist, slightly loaded. There has been no vomiting for some days, but the diarrhœa is very severe. Says he has frequently passed blood by stool. Skin not jaundiced, but rather dry. Respiratory, circulatory, and other systems normal. ℞ *Pil. Plumb. et Opii.*, xij. *Sumat unam ter indies.*

PROGRESS OF THE CASE.—*March 4th.*—Has had occasionally vomiting and diarrhœa since last report, for which he has been taking at times the naphtha mixture, morphia draughts, and gallic acid. To-day the urine is somewhat scanty, and slightly coagulable on the addition of heat and nitric acid; spec. grav. 1024. ℞ *Acetatis Potassæ*, ʒj ; *Sp. Æth. Nit.*, ʒij ; *Syr. Aurantii.* ℥j ; *Aquæ*, ℥v M. *Sumat* ℥j *ter indies.* *March* 12*th.*—To-day the urine was ascertained with the microscope to contain numerous casts of the tubes and isolated epithelial cells loaded with fatty granules. The vomiting and diarrhœa continue. *Habeat suppositorium quaque* 8*va hora.* *April* 6*th.*—The diarrhœa was for a few days somewhat checked by the suppositories, but gradually returned, and is now very severe ; the bowels having been opened twelve times yesterday. The urine has continued albuminous, and loaded with desquamative casts and fatty tubes. To-day its spec. grav. is 1007. There is now great debility, and occasional stupor and drowsiness. *May* 12*th.*—The drowsiness has disappeared. For the last few days has been taking ʒj of the potass. bitart. with the mixture of acetate of potash and nitric æther, and he now passes a larger amount of urine, which is free of tubular casts. The abdomen is less tense. About the middle of May the vomiting and diarrhœa first abated, and was soon after checked. In August his health was so much improved that he was allowed to go out of the house for the benefit of air and exercise. He was readmitted *September 13th*, having enjoyed tolerable health in the interval, although the hepatic swelling is about the same size. He was now ordered, ℞ *Hydrarg. Proto Iodidi*, gr. vj; *Pulv. Opii*, gr. ij; *Ext. Taraxaci*, ʒss; *Conserv. Rosarum*, gr. v *fiant pil.* xx. *Sumat* 1 *ter indies.* These pills on the 20*th* produced salivation, when they were discontinued, and an astringent gargle ordered. The abdomen now measures thirty-six inches in its broadest circumference. *Oct.* 25*th.*—Complains of oppression on walking, of shooting pains through the chest and abdomen. Ascites seems once more to be increasing. *Tr. Iodini to be painted over the abdominal surface. Nov.* 21*st.*—Since last report the liver has greatly diminished in size, and his complaints have ceased. The urine presents a slight hazy albuminous appearance on the addition of heat and nitric acid, but is voided in natural quantity. *Dec.* 13*th.*—The liver is now so reduced in size that its lower margin is only two inches below the false ribs in front, and one inch on the right side. All his functions are apparently healthy, the urine healthy, and his strength appears perfectly re-established. Dismissed.

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* Reported by Mr. J. A. Douglas, Clinical Clerk.

Commentary.—The enlargement of the liver which existed in this man was probably simple hypertrophy, which by pressing upon the large abdominal veins caused ascites. It is worthy of remark, that it underwent a sensible diminution after the local application of Tr. of Iodine, having resisted mercurial action and various other remedies. The occurrence of Bright's disease, with numerous desquamative casts of the tubuli uriniferi, more or less loaded with fat, and accompanied by albumen in and diminished density of the urine, was considered at one period a formidable complication. But here also, under the use of strong diuretics, the renal symptoms subsided, the casts disappeared, and the urine became perfectly healthy. He has since been seen by the clerks walking about the town, and has informed them that he is quite well, and carries on his occupation without any inconvenience.

CASE LXVII.*—*Fatty Enlargement of the Liver.*

HISTORY.—James Grant, æt. 29, blacksmith—admitted October 14th, 1851. His occupation consists of watching an apparatus worked by steam, in an elevated temperature; he has no heavy labour, though constantly standing on his feet; he drinks whisky to a large amount. Since September 1849, he has been three times in the house for various periods, from which he has been dismissed relieved. The liver began to enlarge two years ago, and has been very slowly increasing ever since.

SYMPTOMS ON ADMISSION.—On admission, his digestive functions were well performed, with the exception of looseness in the bowels, having had two or three stools daily for several weeks past. He has, however, a dull heavy pain in the abdomen, extending to the lumbar region. The belly is evidently enlarged at its upper part, where a firm tumour exists, forming a protuberance in the epigastric region. The girth of the abdomen at this place during expiration, is 34 inches. The hepatic dulness extends from two inches below the right nipple, down to a transverse line drawn one inch above the superior spine of the ilium. The whole of the right and part of the left hypochondriac regions are dull on percussion. The tympanitic sound of the stomach is audible in front, the organ being evidently pushed forward by the enlarged liver behind it. The whole surface of the tumour feels smooth, and presents no tenderness. The splenic dulness measures 5½ inches vertically ; skin dry ; no œdema of the legs ; general appearance pale and cachectic ; occasionally he has frequent desire to micturate, but the urine has always presented its normal characters ; considerable breathlessness on exertion, but the lungs and heart, on examination, were apparently quite healthy ; other functions well performed. He was ordered a mixture containing the *Iodide of Potassium,* six grains of which were to be taken three times a-day. Frictions with the *Unguent. Iodinii* were also to be employed daily.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Progress of the Case.—Towards the end of October, the bowels became regular, and his general health was somewhat improved. Frequent micturition, with discharge of pus in the urine now came on, which subsided in a few days. From this time, although the size of the liver underwent no diminution, his bodily strength gradually improved. He occasionally had slight return of looseness in the bowels, which was checked by appropriate remedies. The difficulty of breathing after exertion, also slowly left him ; and he was dismissed greatly relieved, January 26th, 1852.

Commentary.—Fatty liver is now well known to depend on the secretion of a large quantity of oil, which is stored up in the hepatic cells. These cells are under such circumstances frequently enlarged, and contain oil varying in amount from a few granules to a large mass, which occupies the whole of their cavities. Not unfrequently livers, which to the naked eye appear healthy enough, may still be demonstrated under the microscope to contain an unusual number of fat granules, and there can be little doubt that considerable variations may exist in this respect quite compatible with a state of health. Almost all stall-fed animals that do not labour, possess a large amount of fat in their hepatic cells. It is only where the organ is much enlarged, altered in colour, and presses upon neighbouring viscera, that its fatty degeneration can be said to interfere with the vital processes.

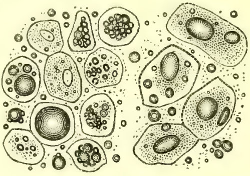

Fig. 377.

In man, fatty degeneration of the liver has been observed to be very common in drunkards who are continually taking alcoholic liquids, that abound in carbon, which being too large in amount to be excreted from the lungs as carbonic acid, and from the liver as bile, is stored up in the latter organ in the form of fat. In tropical climates the same pathological condition comes on under different circumstances. Excess of heat, and a rarified atmosphere, indispose to bodily exercise, while the European, instead of living according to the simple manner of the natives,

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Fig. 377. Hepatic cells in various stages of fatty degeneration. On the right of the figure, yellow granular pigment is also contained in the cells, which were taken from a cirrhosed liver. 250 *diam.*

too often continues to consume his habitual food. But the excretory power of the lungs being thus diminished, the excess of carbon in the tissues and food is thrown upon the liver, and there converted into fat.

The manner in which the livers of geese are made fatty at Strasburg, is as follows. They are confined in close cages, in a heated atmosphere, and largely supplied with food. Want of exercise and heat diminish the respiratory functions, and cause that of the liver to be disordered, and the result is enlargement of the organ from accumulation of fat. In the case before us, such exactly seems to be the cause of the disease. A man is kept stationary watching a steam-engine, in an elevated temperature, whilst he is consuming his usual food, and exceeding in alcoholic drinks.

This view, however, has been objected to on the following grounds:—1st, That the connection between fatty liver and disease of the lungs is not general; 2d, That there is no evidence that a fatty liver does not excrete bile as usual; and 3d, That as a considerable portion of bile is absorbed into the blood to be excreted from the lungs, the liver must be considered as preparing material for these organs. Hence it is argued that it would be a strange compensation if the functions of the liver were to be increased, while that of the lung is diminished by disease (Budd). But if fatty liver be not always conjoined with diseased lung, it will be found associated with some circumstance which diminishes the function of that organ, in relation to the work it is called upon to perform; for instance, the diminished exercise and great heat of tropical climates. Further, although it be granted that the liver may in health prepare carbonaceous matters for pulmonary excretion, it must be clear that if the lungs cannot accomplish this function, such matters must be thrown back or retained in the liver, and constitute a powerful cause of fatty degeneration of that organ. On the whole, therefore, we must regard excess of carbonaceous matters in the system, and the diminution of pulmonary action, as the chief causes of fatty degeneration of the liver; a view which has the merit of pointing out to us as remedies a diminished diet, a temperate climate, appropriate exercise, and an endeavour to promote the functions of the lungs and of the skin.

There is another structural alteration of the liver, which, from the colour and general appearance so like bees' wax it assumes, has been called "waxy" and sometimes "brawny" liver. This disease has been confounded with fatty liver, although an examination of its minute structure will show that the hepatic cells present a very different character. Instead of being enlarged and filled more or less with oil globules, they are colourless, shrunken, and for the most part destitute of contents, while the nucleus has disappeared. (See Fig. 278.) I have previously described this lesion as one of the forms of albuminous degeneration. (See p. 222.) Its clinical history will be given under the head of Phthisis. (See case of Margaret Clark.)

CASE LXVIII.*—*Cirrhosis with Atrophy of the Liver—Ascites.*

HISTORY.—John Harper, æt. 28, farmer, from Caithness. Six years ago, after recovering from measles, his health was greatly deranged. He was weak, and perspired profusely at night, or when performing any unusual exertion. A short time afterwards, he was exposed to cold and wet, and he observed that the abdomen gradually enlarged, and dyspnœa supervened. On two occasions paracentesis abdominis was performed; and at the first operation a quart, and at the second a pint, of fluid was removed, without producing much relief. He has had considerable pain in the epigastric region at times, and latterly the appetite has been diminished, and the bowels costive.

SYMPTOMS ON ADMISSION.—On admission, the abdomen is slightly swollen, and evidently contains fluid. Round the umbilicus it measures 39 inches. No anasarca. The hepatic dulness extends three inches downwards on the right side, commencing two inches under the nipple. Tongue is furred; appetite diminished; no epigastric pain or uneasiness; bowels irregular, but at present costive. There is slight dulness on percussion under the right clavicle, with harsh inspiration, prolonged expiration, and increased vocal resonance; urine scanty, depositing lithates. The other functions are well performed, and he appears to be a strong, well-nourished person.

PROGRESS OF THE CASE.—The treatment consisted of diuretics *(Sp. Æther Nit. and Tr. Digitalis)* and sudorifics (*Pulv. Doveri*); but, feeling the confinement of the Hospital to disagree with him after his usual active occupations, he insisted on going out, which he did July 6th.

Commentary.—The diminished extent of the hepatic dulness, the ascites, and the chronic nature of the disease, point this case out to be one of cirrhosis. This morbid change in the liver consists of the formation of fibrous tissue between the lobules of the organ, whereby its secreting cells are compressed and atrophied. As a further result, the large venous trunks are also compressed, and their commencing ramifications so congested that effusion into, or dropsy of, the peritoneal cavity is induced. Notwithstanding the extensive organic changes which are frequently observed in this disease, danger is not so much to be apprehended from interruption in the functions of the liver, as from the ascites, induced by constriction of the large abdominal veins, which, by distending the abdomen and compressing the lungs and liver, so interferes with those important organs, that death is occasioned.

CASE LXIX.†—*Cirrhosis with Enlargement of Liver—Hypertrophy of Spleen—Slight Leucocythemia—Jaundice—Constriction of Arch and descending Aorta.*

HISTORY.—James Kerr, æt. 28, a labourer—admitted July 22, 1852. This man first had jaundice, with swelling of the abdomen, between four and five years ago; and since then he has been several times in the Infirmary. The treatment has consisted of various alteratives internally, with the occasional application of the Tr. Iodinii, blisters, and leeches externally. The swelling, however, has continued to increase very slowly, and for the last two years he has been incapacitated from working. The blood for some time has contained an excess of fibrin, and a slight increase of the colourless corpuscles; and he has been troubled at intervals with attacks of epistaxis and occasional diarrhœa. For two years past there has been an increased impulse, with a rough blowing murmur, loudest with the first sound under the manubrium of the sternum.

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* Reported by Mr. John Matthews, Clinical Clerk.

† Reported by Messrs. Douglas and Dewar, Clinical Clerks.

Symptoms on Admission.—On admission the hepatic dulness commences an inch below the right nipple, and extends down to the umbilicus, measuring twelve inches vertically. The splenic dulness reaches from the lower margin of the fifth rib to a transverse line drawn an inch below the umbilicus, and measures two inches vertically. The liver presents a protuberance anteriorly, which extends in the form of a ridge, four inches broad, from the epigastrium backwards towards the false ribs. The girth of the abdomen over this ridge is 42 inches. The inferior border of the spleen and liver can be distinctly felt through the parietes of the abdomen. The heart's action and sounds are normal. An increased pulsation is distinctly visible at the root of the neck, and can be felt above the clavicles and under the top of the sternum. Here there is a loud rough murmur synchronous with the systole of the heart, and accompanied by a distinct impulse. There is slight cough, with a little mucous expectoration, but auscultation and percussion of the lungs reveal nothing abnormal. Urine rather scanty, high coloured, spec. grav. 1026, contains some biliary matter, and deposits on cooling a pretty copious pinkish sediment of lithates. The integuments and conjunctivæ are still tinged of a light bile yellow colour. There is considerable tenderness over the liver in the right hypochondrium. He says slight epistaxis returns about once a week. The bowels are open daily; no diarrhœa. After walking or unusual exertion œdema of the legs comes on. On examining the blood microscopically, the colourless corpuscles are not so numerous as when he was last in the house. *Four leeches to be applied to the right hypochondrium.*

Progress of the Case.—This man left the house in August. He was re-admitted November 9th, having in the interval suffered from an attack of pleurisy on the right side. Latterly he has been in the Dundee Hospital, and says that five weeks ago he passed considerable quantities of dark grumous matter from the bowels. In other respects his condition is the same as formerly reported. *November* 11th.—Vomited about nine or ten ounces of blood. 29*th.*—Hematemesis returned yesterday afternoon with great violence, and at intervals he brought up in all 132 ounces of blood. His strength is now greatly diminished; pulse 104, full. The abdominal swelling and aortic signs as formerly reported; but the breathing is laboured, with dyspnœa at night, considerable cough, and muco-purulent expectoration. No dulness on percussion over lungs; but sibilant and sonorous rales are heard at the base of the right lung on auscultation. From this period his general health evidently began to fail. Ascites first came on, followed by œdema of the legs and general anasarca. The dyspnœa became more urgent, with a sense of oppression in the chest, and there was occasional vomiting of blood. On the 21st of December there was considerable hematemesis, and discharge of blood by stool, which was followed by exhausting diarrhœa, He died December 25th.

Sectio Cadaveris.—Fifty-three hours after death.

Body generally anasarcous.

Thorax.—Extensive chronic adhesions between the pleuræ on the right side. On the left side about four ounces of serum in the pleural cavity. Lungs œdematous. Slight emphysema of the left lung anteriorly. Posteriorly both lungs congested, and here and there compressed. The ascending portion of the aortic arch was of normal size, but its transverse and descending portions, as well as the descending aorta generally, were unusually small in caliber, so that the little finger could with difficulty be introduced. In structure the vessel was healthy, but in consequence of this formation a pouch was formed immediately above the sigmoid valves. About two ounces of serum in the pericardium. The heart healthy.

ABDOMEN.—About twenty ounces of serum in the peritoneal cavity. The stomach was about half full of brownish-black blood, containing soft coagula. Mucous coat healthy. Brunner's glands much enlarged, about the size of millet seeds. The intestines everywhere healthy. Mesenteric glands slightly enlarged. Liver weighed nine pounds one ounce, was of a pale gambouge colour throughout, speckled here and there with rounded masses, the size of a pea, having a darker ochrey tint. On section, it offered considerable resistance to the knife, and the fresh cut surface presented a dense, whitish-yellow fibrous structure, with the lobules of the organ atrophied and embedded in it, and of various tints of yellow varying towards white. In short, the last stage of cirrhosis. Spleen weighed three pounds six ounces, and is enlarged from simple hypertrophy. Kidneys, larynx, œsophagus, and other organs healthy.

MICROSCOPIC EXAMINATION.—On making a thin section of the liver with a Valentin's knife, and examining it with a power of 250 diameters, the appearance was seen represented in the woodcut. (Fig. 378.) The stroma of the organ was composed of fibrous substance, surrounding and compressing the hepatic lobules, many of which presented pale cells, more or less filled with yellowish pigment; in some the cells were more or less fatty, and in others waxy. Here and there the spaces were empty, the contents having apparently lost their cohesion, or having been dragged out by the knife.

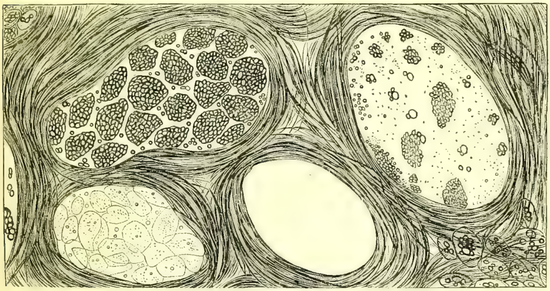

Fig. 378.

Commentary.—The lesion which I presumed to exist in the liver of this man during his life was that of a simple hypertrophy, a disease frequently associated with enlarged spleen and excess of colourless corpuscles in the blood. But on dissection, the liver presented all the structural characters of the last stage of cirrhosis, associated with great

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Fig. 378. Structure of a thin section of liver in the last stage of cirrhosis. 200 *di.*

increase of size in the organ. The fibrous structure especially was very large in amount, the lobules much compressed, and so altered, that, while the cells in many of them were loaded with pigment, some had undergone the fatty, and others the waxy, degeneration. The cirrhosis must have occasioned some obstruction to the perfect excretion of bile, as the jaundice, though slight, has been uniform for more than four years. There had also been epistaxis and frequent diarrhœa, symptoms very common in connection with enlarged liver and spleen, although the *rationale* of their production is by no means obvious. For a long time he suffered no inconvenience from the abdominal swelling, except from its bulk and occasional tenderness, unless indeed dyspnœa be taken into consideration, which was attributed partly to an aneurismal dilatation of the aortic arch. A dilatation in point of fact did exist, and a certain obstruction must have been occasioned, from the state of the parts described, that occasioned all the physical signs and functional symptoms of aneurism of the aorta. The origin of the excessive hemorrhages is involved in mystery, the most careful examination of the body having failed to detect lesion of any vessel, or of any part of the mucous membrane. Some years ago I opened the body of a man whose stomach was found filled with a firm coagulum of blood, so that, when the organ was opened, it could be turned out, presenting a cast of its interior, weighing between two and three pounds. Yet the most minute inspection did not enable me to discover the slightest lesion to which such extensive hemorrhage could be attributed. Such lesion, however, must have existed; for no one can now conceive the possibility of blood corpuscles passing through the vascular walls by transudation, as was formerly imagined. We may, I think, theoretically ascribe them to the excessive congestions occasioned, and to the rupture of capillaries which escape detection after death. Another fact worthy of observation in the case of Kerr was, that the excess of colourless corpuscles in the blood (leucocythemia), which existed when he first came under my notice, had entirely disappeared during the last few months of his life.

The treatment in cirrhosis must be purely palliative, and directed to diminishing the ascites, by means of diuretics and diaphoretics. The question of drawing off the fluid by paracentesis is one which may arise, in case the swelling is very great, and the embarrassment to the pulmonary and renal organs extreme. Even then, although temporary relief may be obtained by the operation, there is every reason to believe that, in the majority of cases, life is in no way prolonged.

A condition of the liver is frequently seen, and which has been called the *nutmeg liver*, from the resemblance it presents to the fresh-cut surface of a nutmeg. That is to say, it exhibits bright red or brown points, surrounded by a whitish or slightly yellow substance. On making thin sections of such a liver, it will be seen that whilst the vessels of the lobules, and especially their central parts, are distended with blood, that the cells at the margins of the lobules have undergone the fatty degeneration. It has been supposed by some that this condition is an incipient cirrhosis, by others an incipient fatty degeneration of the organ. Certain it is that in such cases the fatty cells are formed at the circumference of the lobule, in immediate relation to the portal capillaries, which are loaded with blood. It has been called interlobular fatty degeneration, but is in fact fatty degeneration of the cells at the circumference of the lobule. Wedl has pointed out that in some rare forms of this lesion there is a deposit of pigment in the cells nearest the hepatic capillaries, and occupying the centre of the lobule, without any fatty degeneration whatever. Pigment may also occur in the veins themselves. At other times the

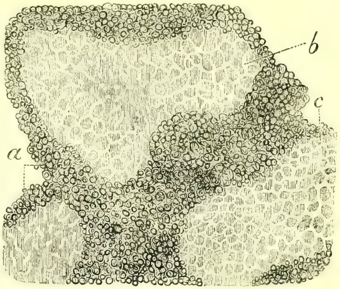

Fig. 379.

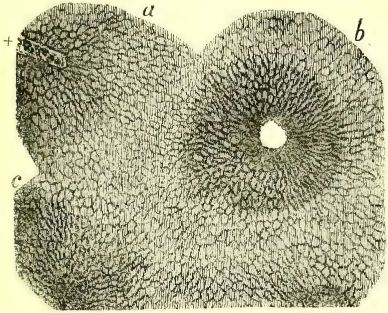

Fig. 380.

Fig. 379. Peri-lobular fatty or nutmeg liver. *a*, Fatty degeneration around the lobules; *b* and *c*, Centres of the lobules with the vessels congested.—(*Wedl.*)

Fig. 380. Pigmented nutmeg liver. *a*, Lobule with the central vein divided at +, containing amorphous pigment; *b*, Lobule with the central vein healthy; *c*, The central vein filled with pigment. The radiated central pigment is owing to its being deposited in that portion of the hepatic cells nearest the capillaries.—(*Wedl.*) 90 *diam.*

fatty and pigmentary degenerations of the liver may be more or less combined, the former existing at the periphery, and the latter at the centre of the lobule. We have no clinical history of these forms of nutmeg liver, nor, so far as is yet known, do they occasion any symptoms susceptible of being recognised in the living body.

CASE LXX.*—*Cancerous Exudation into the Liver—Cancerous Ulceration of Œsophagus—Simple Stricture of Pylorus—Profuse Hematemesis—Aneurism of Thoracic Aorta, bursting into the left Pleura.*

HISTORY.—Thomas Stewart, æt. 54, bookseller; admitted November 28, 1849. States that about six years ago he had an attack of hemoptysis, but with this exception, he has always enjoyed good health, till about four months ago. At that time his appetite began to fail, and he felt sick after eating, occasionally vomiting his food. Since then the sickness has been increasing, and about three or four weeks ago, he began to vomit blood. He has also been affected with pain in the throat on attempting to swallow, and a sense of constriction in the œsophagus, opposite the superior border of the sternum. He states, that he can very seldom take food without exciting vomiting; but occasionally, when he succeeds in retaining it for half an hour, the sense of sickness passes off. He further states, that he vomits blood mixed with clots of dark-brown masses. This does not occur after eating, but generally between three and five in the morning; occasionally, however, it occurs during the day, and is then preceded by a fit of coughing. He has been losing flesh lately to a great extent, and is now very thin, but was formerly of a stout and robust habit of body.

SYMPTOMS ON ADMISSION.—On admission, he appears pale and emaciated. Complains of great general weakness. Tongue much furred, and the superior surface fissured. He has pain and constriction on attempting to swallow. Is sick, and generally vomits after every meal, and this whether his diet be solid or fluid. Vomits a great deal of florid blood, mixed with dark grumous masses, and clots of a black colour. On examining this fluid under the microscope, it is seen to consist chiefly of blood corpuscles and epithelial scales; no cancer cells can be detected. He states that on Friday last (Nov. 23), he vomited about half a gallon of blood, and on the following day even a larger quantity. There is great tenderness over the region of the stomach; and on examination, a hard lobulated oval tumour is discovered on the right side of the epigastric region, measuring four inches transversely, and two inches from above downwards. The appetite is bad, and has been getting worse of late. Bowels usually regular. He complains of cough, which has existed for about four months; no dyspnœa. On percussion, the chest sounds well, except that there is dulness over the lower third of the left lung posteriorly. On auscultation, the expiration is prolonged anteriorly, and crepitation is heard over the part where dulness is elicited on percussion. Pulse 90, of tolerable strength. Complains of occasional palpitation, and the impulse of the heart is somewhat increased; but on auscultation, the heart's sounds are normal. Urine, sp. gr. 1020, natural in quantity, not coagulable; deposits, on cooling, an abundant lateritious sediment of lithate of ammonia. Complains of giddiness, and is unable to walk well, owing to weakness. *Four leeches to be applied over the tumour in epigastrium.* ℞. *Pulv. Opii* gr. ij; *Extract. Hyoscyam.* gr. xii. *M. et divide in pil.* iv. *One to*

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* Reported by Mr. Hugh Balfour, Clinical Clerk.

be taken morning and evening. ℞. *Napthæ Medicin.* ʒi; *Mist. Camphoræ.* ℥iij. M. *Half an ounce to be taken every three hours.*

Progress of the Case.—*December 1st.*—Pain and tenderness are somewhat relieved by the leeches. Still vomits, but not to so great an extent as formerly. From this time he went on, with occasional exacerbations and remissions, but on the whole became manifestly weaker. Every now and then he vomited large quantities of florid blood, and on one occasion the quantity amounted to thirty-six ounces. *Gallic acid* and *acetate of lead and opium* were given at these times. After each attack of hematemesis, for some hours small quantities of blood came welling up into his mouth, and were expectorated. On *December 14th*, it is noted that the weakness is increasing, and appetite diminishing. He was then ordered *eight ounces of wine daily, and beef-tea enemata.* *17th.*—Extremely weak, and quite unable to take food, evidently sinking. *18th.*—Died this morning at four A.M.

Sectio Cadaveris.—Twenty-one hours after death.

The body was livid and greatly emaciated. On reflecting the integuments from the thorax and abdomen, a nodulated portion of the liver, nearly separated from the rest, very movable, containing a large mass of cancerous exudation, and measuring four by two inches across, projected as a distinct tumour into the epigastrium, and was evidently the same swelling as had been felt during life, through the integuments.

Thorax.—The cavity of the left pleura contained about a pound and a half of recently coagulated blood. The pericardium contained about six ounces of clear straw-coloured serum. Heart much contracted. The whole of the thoracic viscera, together with the trachea, and great vessels, were removed *en masse.* The blood in the pleura was then seen to have issued from between the lobes of the left lung, through a laceration of the pleura, at the external and back part of that organ. The aorta being slit up, was found to be somewhat rough internally. At the outer part of the arch, where it joins the descending aorta, the left side of the vessel was perforated by a nearly circular aperture, two inches in diameter, with smooth edges, which led into an aneurismal sac, the size of a large cocoa-nut, filled with a soft coagulum. The aneurismal sac pressed and encroached on the left lung inferiorly, and communicated with the pleural cavity through a recent ragged laceration in the pleura costalis, three inches in length. Here and there, immediately round the sac, the lung was infiltrated with blood, and greatly softened. In these places it was very thin, and presented several perforations, through which hemorrhage into the lung must have taken place. No communication could be discovered between the aneurismal sac and the stomach or œsophagus. The whole arch of aorta was slightly dilated; the valves healthy. Between the thoracic aorta and the œsophagus there were two masses of glands, greatly enlarged from cancerous infiltration. The œsophagus itself was ulcerated about its middle, and the enlarged glands before mentioned projected into its cavity. This ulceration surrounded the tube internally, and extended about three inches from above downwards, presenting a soft pultaceous surface, the result of disintegrated cancerous exudation. The lung presented throughout a number of small irregular-shaped masses of exudation, not larger, in most instances, than four or five lines in diameter, and resembling masses of crude tubercle, but somewhat softer, and slightly redder in colour. There were also one or two larger masses, nearly globular in form, from one-fourth to three-fourths of an inch in diameter, of soft consistence, yielding a cream-coloured juice, and marked with one or two red vessels and reddish points. The bronchial glands were infiltrated with black matter, and mostly contained masses of cancerous exudation similar to, but smaller than, those in the lung.

Abdomen.—The peritoneum covering the diaphragm, as well as that in the pelvis and several other places, showed fungus-like projections and nodules of irregular form—the largest two inches in diameter, flattened on their surface, of a yellowish-white colour, mottled with numerous red vessels externally. Internally they were of a similar colour and appearance—crossed by fibres, which included matter of the consistence and general appearance of boiled ground rice. In the pelvic cavity, at its most depending parts, there were about two ounces of bloody pus and lymph, infiltrated with blood, and here and there these existed in small patches on the surface of the intestines and parietal peritoneum. The liver was much enlarged, and weighed six pounds ten ounces. It contained numerous nodular masses, which on the surface were cup-shaped. The largest were nearly four inches across, and were usually softened in their centre. On section, they presented the ordinary appearance of encephaloma of the liver, with the exception, that in many places their substance was partly diffluent, and on section excavations or cavities were left in the mass. Some of them contained a creamy yellowish fluid, mixed with red, and others olive-coloured serum, with a large amount of flocculent and granular pinkish debris. Here and there, also, masses of reticulum were infiltrated among the whitish and greyish cancerous exudation. The liver itself was pale fawn coloured and very fatty. The stomach was perfectly healthy ; but there was a simple stricture at the pylorus, which with difficulty admitted the introduction of the little finger, and which depended on hypertrophy of the areolar tissue between the muscular and mucous coats. The intestines were extremely contracted ; the colon not being above one-half inch in diameter. *Kidneys* pale, containing numerous small cysts. The epithelium, however, was nearly healthy, exhibiting under the microscope only a small quantity of granular matter. The mesenteric and lumbar glands were healthy.

MICROSCOPIC EXAMINATION.—A small portion of the white and tolerably consistent cancerous exudation in the liver presented numerous cancer cells, varying greatly in size and shape, but none exceeding the 1-50th of a millimetre in its longest diameter. Many were nucleated, and several were evidently breaking up and disintegrating. They were associated with some free nuclei, and a multitude of molecules and granules—(Fig. 31). The reticulum was wholly composed of fatty molecules and granules—(Fig. 32). The broken-down matter on the surface of the œsophagus, where it was ulcerated, closely resembled that represented in Fig. 31, but was even more disintegrated. The milky juice squeezed from the glands between the thoracic aorta and the œsophagus, presented large cancer cells, which presented the various appearances characteristic of their undergoing the fatty degeneration—(Fig. 33.)

Commentary.—During life, the pain in the stomach, the vomiting after food, the black bloody coagula rendered, and the distinct nodulated and somewhat movable tumour in the epigastrium, left little doubt in the minds of all those who examined the case, that we had to do with cancer of the pylorus. On examination after death, however, the tumour which had previously been felt, was found to be a nodule of cancerous exudation developing itself in the liver, a part of which had been pushed forward so as to occasion the swelling. As the rest of the liver was entirely hid under the ribs, it was not possible to have suspected this occurrence during life. The simple stricture, however, that really existed in the pylorus, conjoined with the pressure exercised by the tumour on the valve, caused the vomiting that formed the principal feature of the disease.

The appearance of the matters rendered by the mouth, proved that they must have come from the stomach; because, although a considerable quantity of red blood was evacuated, this was commonly mingled with rusty brown, and even perfectly black, coagula. Besides, on one occasion, he was actually seen by the clerk to render the blood by the act of vomiting; and the same thing was repeatedly observed by the nurse. At first, then, I considered that the cancer of the stomach had ulcerated internally, and poured out the blood evacuated; but, latterly, from the large quantities discharged, my suspicions were fixed on the presence of an aneurism pressing on the lung, and communicating with the trachea, in which case he must have swallowed the blood. This supposition seemed to be confirmed by the existence of limited dulness on the left side, and by crepitation — an almost invariable concomitant of aneurism so situated.

On attempting, after death, to ascertain by what means the blood entered the stomach, I could not find any direct communication between the aneurism and that viscus, or the œsophagus. I concluded, therefore, that the blood must, in the first instance, have been infiltrated into the substance of the lung, have passed through the bronchi, trachea, and larynx, into the pharynx, and been thus swallowed. At least, such is the only supposition that the facts of the case seem to warrant.

This man presented in a very marked degree the so-called peculiar cachectic aspect of malignant disease. I have always noticed that this aspect is best marked in individuals labouring under cancer of the stomach, which interferes with the process of nutrition. It is stated in the report that he had previously been stout and fat—a condition I have pointed out in another place* to be favourable to the development of cancer generally. I am inclined to think that this malignant aspect so much dwelt on by practitioners, is the mere result of emaciation from interference with the nutritive processes, or from pain and want of sleep, and is in no way distinctive of cancer in organs where such effects are not occasioned.

Cancer of the liver may occur in two forms—1st, That of distinct nodules, which have been so well described by Baillie and Farre; 2d, More or less infiltrated in minute grains throughout the hepatic tissue. The former is by far the most common, and when it presents projections from the surface of the organ, these constitute the only positive proof of its being affected with cancer. In some rare cases I have seen these two forms run into one another. Softening of the cancerous masses was well observed in the case just recorded, as well as its transformation into the fatty substance which forms the so-called reticulum. In the majority of cases of cancerous liver other organs of the body are similarly affected, rendering the disease more or less complicated. (See Cases LXV. and LXXVI.) The treatment must be entirely palliative.

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* On Cancerous and Cancroid Growths. Edinburgh, 1849.

DISEASES OF THE INTESTINES.

Case LXXI.*—*Diarrhœa—Recovery.*

History.—Mary Gordon, æt. 21, a thin weak-looking woman, now employed in curing herrings—admitted in the afternoon of July 25th, 1855. She has for the last two days been much exposed to cold and wet, and early this morning was seized with violent pain in the epigastric and lumbar regions, accompanied by shivering, sickness, and vomiting. At nine o'clock the bowels were freely opened, and since then she has had several fluid stools, with griping pain in the abdomen, and violent tenesmus. The matters discharged from the bowels she describes as watery, mingled with slime. She has taken some brandy, which caused slight relief.

Symptoms on Admission.—On admission the tongue is white, appetite impaired, great thirst, no nausea nor vomiting at present, no tenderness over stomach or abdomen. Bowels still loose; the matter discharged consists of a dirty yellow fluid, in which masses of mucus are floating. No blood nor pus. Pulse 84, full. Says she has occasional palpitations. Countenance slightly flushed. Considerable lumbar pain. Urine healthy. Other functions well performed. ℞ *Tr. Opii* ʒj; *Conf. Opii* ℈j; *Mist. Cretæ comp.* ℥iij; M. ℥ss, *to be taken every three hours.*

Progress of the Case.—*July 26th.*—To-day feels weak, but the diarrhœa ceased after the second dose of the mixture. *July 27th.*—Still very exhausted. To have nutrients with wine ℥ij daily. She rapidly recovered, and was discharged, August 2d.

Case LXXII.†—*Diarrhœa—Recovery.*

History.—Frederick Lyons, æt. 4—admitted December 19th, 1854. The mother says he has been fed regularly, if not plentifully, but that up to two months ago he was quite healthy. He was then sent to school, ever since which he has eaten everything given to him and had diarrhœa, the bowels being generally open five or six times a day. He has been losing strength up to the present time.

Symptoms on Admission.—The child is now very thin, is always picking his nose. Tongue clean. Abdomen tumid and tender on pressure. Has had six stools within the last twenty-four hours, of fluid consistence and clay colour. Pulse 96, weak. Has never been known to pass worms. Other systems normal. *Habeat Ol. Ricini* ʒij. *Nutritious diet. To remain in bed.*

Progress of the Case.—Diarrhœa diminished. Stools of a more healthy colour. Takes rice and milk greedily. From this time he rapidly recovered. All diarrhœa had ceased on the 24th. On the 27th he was allowed to get up; there was then no tenderness of abdomen, and the tumidity had nearly disappeared. Discharged well, January 8th.

Commentary.—The cases of diarrhœa here recorded are examples of the two most common forms of this disorder, the one originating from exposure to wet and cold, the other from irregularities in diet. In the first case the discharge was checked by opium and chalk, in the second by a mild aperient, proper nourishment, and rest.

Many varieties of diarrhœa, or excessive discharge from the bowels, have been described by systematic writers, but pathologically they may all be referred to two causes, namely:—1st, A disturbance of the healthy conditions of the blood, leading to increased eliminating action of the intestinal mucous membrane, as after exposure to cold or wet occasioning suppressed transpiration; in cholera; in leucocythemia; in various acute inflammatory diseases—when it may be critical—and so on. 2d, From irritating substances in the canal itself derived from food or drink; from an increased amount of bile or other secretion; from structural disease of the mucous membrane, as in dysenteric, tubercular, or typhoid ulcerations; from worms or foreign bodies impacted in the gut, etc. etc. The indications for treating those two forms of diarrhœa are very different. In the first it may be sanative in itself, and only symptomatic, or the natural termination of a general disorder which it would sometimes be injurious and even dangerous to check. In the second, the diarrhœa is always hurtful if long continued, and our hopes of correcting it will mainly depend on our capability of removing the local irritating cause.

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* Reported by Mr. Simon Mutakisna, Clinical Clerk.

† Reported by Mr. Arthur W. Moore, Clinical Clerk.

Thus if, as very commonly happens, improper diet be the cause, this must of course be better regulated. If any special irritating substance has been taken, and occasions griping with tenesmus, a simple warm-water injection, slowly introduced, so as to distend and wash out the rectum may at once remove it. If not, a dose of castor oil, followed by an antacid and anodyne mixture, such as the compound chalk mixture, with a little Tr. opii. generally succeeds. To this, if the discharge continue, the various astringents may be added, and given by the mouth or by the rectum. Quietude is a very necessary part of the treatment, and confinement to bed in all severe cases of the greatest importance. When diarrhœa is symptomatic of deranged liver, of intestinal ulcerations, of worms, or other irritating cause, the treatment resolves itself into the appropriate method of removing the original disorder.

The opposite disease to diarrhœa is constipation, which is diminished, difficult, or suspended discharge from the bowels. This also may be the result of constitutional or local causes, and give rise to indications for treatment directed to overcome the one and remove the other. In most cases, however, there is torpor and diminished nervous energy affecting the contractility of the intestinal muscular coat. All that I think it necessary to say here is, that purgatives, although necessary to overcome temporary obstructions and give immediate ease, do not tend in themselves to remove the causes of, and therefore seldom permanently cure, a constipation. The best means for accomplishing this are appropriate diet, the use of particular kinds of food, such as brown bread, preparations of fruit, etc.; exercise, baths, pleasure-excursions, a course of saline waters, etc. etc. In constipation, as in diarrhœa, should any structural disease or mechanical impediment exist, its treatment must be regulated according to the circumstances of the disease of which it is symptomatic.

The use of purgatives in intestinal disease is a subject of great importance, and one which appears to me to have been much misunderstood. It has been supposed, for instance, that a good alvine evacuation once a day is necessary to the healthy state of the body, and that an individual who only has such an evacuation once in two days, and sometimes in three is constipated. This idea has led to the habitual use of purgatives, and is the principal cause of the enormous number of aperient pills annually sold with government stamps in this country. The fact is, that many persons naturally never have a motion above once in two or three days, and retain their health quite well. The rule ought to be that in all such cases purgatives are unnecessary unless inconvenience, or some decided symptom follow retention of the fœces. Again, it has been supposed that purgatives are antiphlogistic, and so far has their administration been supposed beneficial, that there is scarcely a disease, the treatment of which at one time was not commenced by a smart aperient, with a view of cleansing out the bowels, in order to have a clear field as it were for future operations. But purgation can in no way benefit a distant part actually inflamed, whilst its employment at the commencement of many diseases, and more especially of typhus and peritonitis is positively injurious. The chief uses of purgatives are to overcome temporary obstructions, to remove irritating substances; to solicit the flow of bile and other secretions at the upper part of the canal, and to excite watery discharges in certain cases of dropsy. For this purpose the practitioner must be acquainted with the properties of the different kinds of purgatives, and choose such only as, when properly administered, will best effect his object. Everything like routine practice should be avoided.

CASE LXXIII.*—*Acute Dysentery—Recovery.*

HISTORY.—Timothy Flynn, æt. 14, a hawker—admitted November 26th, 1852. States that on the 22d inst., when in Perth, he was suddenly seized with looseness of the bowels, griping pains in the abdomen, and tenesmus not preceded by shivering. He attributes the attack to having breakfasted on oatmeal porridge, a kind of food to which he was not accustomed, although he has been much exposed to wet, cold, and fatigue. On the first day of his illness, the calls to stool occurred several times in an hour. On the following day he observed that he was passing blood with the fœces, and sometimes nothing but small quantities of thick bloody matter of tough consistence like glue. Notwithstanding these symptoms, he walked from Perth to Edinburgh, the frequent bloody stools continuing, but the pain gradually abating.

SYMPTOMS ON ADMISSION.—Tongue is dry in the centre, the tip and edges being clean and moist. Appetite much impaired; thirst moderate. Thinks he has had twelve stools during the last twenty-four hours, which were mixed with blood. Has still tenesmus and much straining. Complains of a constant and rather sharp pain at the lower part of the abdomen, which is greatly increased on pressure, and follows the course of the sigmoid flexure and rectum. This pain, he says, appeared on the second day of his illness, a few hours before the appearance of the blood. Pulse 92, small and soft. Urine diminished in quantity but healthy. Other functions well performed. ℞ *Tr. Catechu* ℥ss ; *Sol. Mur. Morph.* ʒj ; *Mist. Cretæ comp. ad* ℥viij. M. *Sumat* ℥j *quaque tertia hora.*

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* Reported by Mr. Wm. Calder, Clinical Clerk.

Progress of the Case.—The bowels have been opened twelve or fourteen times since yesterday's visit. Pain still very severe in the left iliac fossa. A considerable quantity of blood and mucus in the stools. *Applicent. Hirudines* xij *parti. dolenti. Injiciatur Enema Amyli cum Tr. Opii* ʒj. *November 28th.*—Six stools since yesterday, very watery with traces of blood. No tenesmus. *Continuatur Mist. Nov. 30th.*—Six stools, more fœculent, and without blood. From this time he rapidly recovered, and was dismissed quite well, December 9th.

Case LXXIV.*—*Sub-Acute Dysentery—Recovery.*

History.—John M'Gee, æt. 38, a mason's labourer—admitted June 29th, 1853. Says that last summer he was confined to his house for twenty-six weeks, in consequence of severe bowel complaint, and has been subject to diarrhœa every now and then ever since. He returned to his work last February, but was again obliged to desist nine weeks ago in consequence of the severity of the bowel complaint and weakness. Three weeks since he observed the stools to be tinged with blood. Six days ago he vomited a tenacious mass of the appearance of white of egg. He has been much addicted to the use of ardent spirits, and is very intemperate. The medicines he has taken have been of little benefit.

Symptoms on Admission.—Tongue smooth and moist anteriorly, but somewhat loaded at the base. Appetite tolerably good. No fever. There is tenderness on pressure over the abdomen generally, and frequently griping pains. Has about thirteen stools a day, which are thin, of pale yellow colour, containing a quantity of pus. Pulse 80, weak. Other systems healthy. ℞ *Pil. Plumb. Acet.* j *quaque quarta hora. Habeat Suppositor. cum Mur. Morph.* gr. ss *vespere. July* 1*st.*—Increased pain in the abdomen. *Applicent. Hirudines* vj. *July 2d.*—No change. Complains of thirst. *Intermit. Pil. Plumb.* ℞ *Confect. Aromat.* ʒss ; *Sol. Mur. Morph.* ʒiss ; *Tr. Catechu* ʒvj ; *Mist. Cretæ* ℥v M. *A table-spoonful to be taken every four hours. Habeat. Enema Amyli cum Tr. Opii* ♏ xl. ℞ *Lactis recentis* ℥x ; *Ag. Calcis* ℥viij. M. *To be used as drink. July 4th.*—Has now only six stools in the twenty-four hours. Complains of dysuria, and has only passed nineteen ounces of urine daily for three days. ℞ *Sp. Æther. Nit.* ℥ss ; *Pot. Acet.* ʒij ; *Syr. Aurant.* ℥j ; *Aquæ* ℥ivss M. *A table-spoonful to be taken three times a day. July 7th.*—Has now only three or four stools daily, which are fœculent. No dysuria. Urine more copious. Considerable uneasiness in the epigastric region. *Omit. Mist. Diuretica. Applicet Emp. Lyttæ* 3 x 4 *Epigastrio. Habeat Enema Opiata vespere. July 25th.*—Since last report has had about three stools on an average daily. He feels much stronger. *Aug. 1st.*—Has had occasional exacerbations of fever, with thirst, accompanied by increased looseness, which have been checked by the *Pil. Plumb. Opiat.* From this date he continued slowly gaining strength, taking occasional exercise, but subject every now and then to relapses, for which he was ordered tannin with opium, and occasional suppositories. Gradually the pus disappeared from the stools, which became more fœculent and regular. He was dismissed quite well, September 20th.

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* Reported by Mr. T. D. Maclaren, Clinical Clerk.

CASE LXXV.*—*Chronic Dysentery—Ascites and Œdema of the Legs—Leucocythemia—Cirrhosis of the Liver—Cancer of the Lung.*

HISTORY.—Thomas Crease, æt. 28, single—admitted May 27th, 1857. Has been of intemperate habits. Since November 1856 has been troubled with violent cough—sputum being tinged with blood; voice hoarse; feet and legs more or less swollen, hot and tender, especially the ankles. This attack dated from a definite day which he could not name in November, after exposure to cold while crossing the Queensferry. He was under treatment in the Infirmary from March 6th to April 28th, 1857; there were present during that time cough, with bloody or rusty sputum, which, however, occasionally became frothy and mucous; a doughy and œdematous condition of the feet, and latterly of the hands; an unusual temperature of skin, and a pulse more or less thrilling and hard. There was no diarrhœa. After leaving hospital he was for four weeks under quack treatment; getting steaks, ale, and brandy almost *ad libitum.* No relief was obtained; the heat of skin, thirst, and exhaustion continued, and the bowels became loose. The cough became less troublesome, and the expectoration scanty.

SYMPTOMS ON ADMISSION.—Percussion note is rather flat on the right side of thorax anteriorly, and over the upper half on same side posteriorly. The respiratory murmurs are very feeble. When audible they are harsh; no sibilus nor moist rale; vocal resonance increased under right clavicle; no dyspnœa; no cough nor sputum to-day. Cardiac impulse weak; the transverse dulness is normal; the sounds are normal, but a systolic blowing murmur is said by the clerk to have occurred formerly at night. It is not now audible. The pulse 126, rather full and hard. The tongue is covered with fur; thirst great, appetite bad. Abdomen on palpation is natural; no dulness on percussion, nor tenderness on pressure. The bowels are reported loose, but patient does not complain of their frequency. Urine is quite natural. The skin over the body generally is of an unusually high temperature and dry. No lesion of the nervous system; is exhausted, and is mentally despondent. *Is ordered wine* (℥iij) *and saline diaphoretics.*

PROGRESS OF THE CASE.—*May 31st.*—Sputum rather frothy, semi-transparent, gelatinous, slightly tinged with blood; pulse 114; febrile condition the same; the diarrhœa has not ceased. *June 3d.*—Diarrhœa continues; fœces of a light yellow colour and pea-soup consistence, of an extremely fœculent odour, presenting on microscopic examination no blood discs nor other abnormal bodies. *Ordered an astringent and chalk mixture. June 7th.*—Febrile symptoms continue; *ordered* 3 *grains of quinine thrice daily.* The diarrhœa slightly abated; *continue the astringent mixture. June 11th.*—Diarrhœa continues with much tenesmus; frequent calls (from 6 to 8 times) at night to stool; evacuations at each time are scanty; stools watery. Let him have an opiate suppository at night, and after every stool let the following enema be administered:—℞ *Plumb. Acetat.* ℈j; *Aq. Distill.* ℥iss; *Sol. Mur. Morph.* ʒss. *June 15th.*—Patient expresses himself as better, and the febrile excitement is diminished. *June 24th.*—The diarrhœa has not ceased; the injections cause pain and are speedily ejected; they are now discontinued; *ordered half ounce of the decoction of the Indian Bael thrice daily. June 27th.*—In addition to the decoction, let him have, thrice daily, one of the following powders:—℞ *Pulv. Cretae. prep.* ʒij; *Confect. Aromat.* ℈j; *Pulv. opii,* gr. iij. *M. et divide in chartulas duodecem. July 2d.*—Febrile symptoms and diarrhœa much diminished; skin cooler; pulse 86, of moderate strength; œdema of the legs is much less than formerly. On the

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* Reported by Messrs. John Lowe and Stewart Lockie, Clinical Clerks.

4th, he becomes worse; on the *5th*, feels better; on the *8th*, diarrhœa again more severe, and febrile symptoms renewed. On the *9th*, the blood was microscopically examined, and an increase of white corpuscles was detected (from 20 to 25 being visible in one field), and the red discs arranged themselves in irregular masses. On the *11th*, the powders and decoction are discontinued, and *a mixture of Kino, Catechu, and Simarouba was given*. On the *13th*, the diarrhœa being persistent, the use of the powders is resumed, and at night an astringent injection. On the *15th* and *17th*, is better; on the *20th*, is worse and seldom off the stool; on the *21st*, is better, having had only three stools; on the *24th*, has six stools, skin being burning hot, pulse 120, hard, and apparently strong, but patient complains of great debility. *July 26th*.—Great thirst; pain over abdomen, which is relieved by a turpentine epithem. Abdomen is tense, with skin white, glistening and dry; percussion very tympanitic anteriorly; is slightly dull over the flanks. *July 28th*.—Patient is extremely weak; fœces are passed in bed. Urine is examined and found non-albuminous; has been delirious this morning. *July 29th*.—No return of the delirium; swelling of abdomen increased; the diarrhœa and febrile state continue; pulse 112, very weak; great thirst. *July 30th*.—Died this morning at 9.30 A.M.

Sectio Cadaveris.—Forty-eight hours after death.

Body.—Moderately emaciated; œdema of feet and legs; face with a peculiar feverish expression.

Thorax.—Heart was quite natural. The two upper lobes of right lung healthy; the lower lobe felt heavy, presenting a rounded prominence about 3 inches in diameter, projecting from its surface. On section it was found to be a mass of soft cancer, of an oval form, about the size of the fist; greyish or pinkish-white in colour, with some opaque yellow patches (reticulum) intermixed with it. It readily broke down under pressure, and part had already undergone softening. In its neighbourhood were two other masses of similar character, about the size of small marbles. In the lower lobe of the left lung there was a cancerous mass of the size of a filbert; otherwise the lung was healthy. The bronchial glands were natural.

Abdomen.—The peritoneum contained nearly a gallon of a somewhat opalescent serum. The liver was of small size, and presented a coarsely granular surface. On section it was found in a moderately advanced state of cirrhosis; it weighed 2 lbs. 8 oz. The spleen was quite natural, and weighed 6 ounces. Kidneys healthy. Stomach normal. The coats of the small intestines were generally thickened and œdematous, but there was no trace of ulceration. The mucous membrane of the large intestines was found extensively ulcerated, chiefly in the transverse and descending colon. There were a few in the cœcum and upper part of the rectum; they ceased altogether about 3 inches above the anus. The caliber of the intestine was diminished. The ulcerations were of a very chronic character, there being no increased vascularity of the surrounding mucous membrane. They were generally arranged in a linear direction, parallel to the long axis of the gut. Many were nearly cicatrized, presenting in the base and margin an accumulation of dark-coloured pigment. There were pretty numerous slate-coloured cicatrices, indicating the position of former ulcers. No other lesion was found.

Microscopic Examination.—The cancerous exudation in the lungs contained numerous cancer cells in all stages of development. Some of them were very large, and contained from three to five secondary cells. Several of them contained clear collections of fluid, as represented Fig. 119.

Commentary.— The three cases now related present the same disease in different degrees of severity. In the first there is every reason to suppose that though severe, it was not extensive; in the second it became more chronic, but ultimately got well; while in the third it went on to such extensive ulceration, kept up such constant irritative fever, and so interfered with nutrition, as, with the other lesions under which the man laboured, to cause death. On dissection afterwards it was seen that he laboured under chronic disease of the liver, which had caused ascites and œdema of the extremities. On this had supervened the inflammation of the lower bowel, especially of the colon, which had proceeded to ulceration, extending over a considerable portion of the mucous membrane. In many places the ulcers had healed, while in others there was exhibited a tendency to cicatrization; and it is very possible that a recovery might have occurred in this case, as in the one which preceded it, but for the hepatic disease, which, by keeping up constant congestion of the portal system, and therefore of the intestinal venous capillaries, must have opposed itself to all successful efforts at cure. The masses of cancer in the lower portion of the lungs, which were developed with many of the symptoms of pneumonia, especially cough and bloody expectoration, cannot be said to have had any influence in producing the fatal termination.

In the case of Crease I employed, as an astringent, a decoction of the unripe fruit of the Indian Bael, commonly called the Bengal Quince. It is said to contain tannin, both free and in a combined state, aromatic principle, mucilage, and a small amount of bitter principle supposed to be sedative. The decoction must be used fresh, and is prepared by simmering two ounces of the unripe fruit in a pint of water down to a fourth, of which from one to three table-spoonfuls constitute a dose. In the case of a gentleman under my care, whose obstinate diarrhœa had resisted all the usual means, this decoction checked the disorder permanently after a few doses; and I have since given it with great advantage in similar cases. In the case of Crease it was of no benefit whatever. Indeed it cannot be supposed that where actual ulcerations exist over a considerable portion of the mucous surface of the colon, that any remedies can produce an impression on the alvine discharges. These are the result of the organic lesion, so that medicines merely directed to the symptoms, unless they favour cicatrization, cannot operate with effect. This requires time, general health of body, avoidance of irritating food and mental excitement, quietude, a good atmosphere, pure water, etc. etc.—in short, local agents must be combined with all those general remedies and hygienic conditions calculated to improve the vital powers, and favour regeneration of tissue.

Diarrhœa and dysentery pass into one another, for while a great variety of lesions may induce the first, the last is considered to be a true inflammation of the large intestines. Hence its symptoms are local pain, accompanied by fever, and attended with a discharge from the bowels, first of blood and then of pus. The former is occasioned by rupture of the capillaries from congestion, producing hemorrhage, which is mingled with the mucous discharge. The latter is occasioned at first by fluid exudation poured out on the surface mingling with the excess of mucus and blood, but subsequently from the purulent matter thrown off from the ulcerated surface of the mucous membrane.

The character of the fœcal evacuations is of great importance to be attended to, not only in dysentery, but in all forms of intestinal disease. In health the stool consists of a soft solid mass, forming a mould of the outlet at the anus. It is mingled with bile, and presents a dark brown colour. Its odour, though fœcal, is no way that of putridity. As a general rule, the more the alvine evacuation departs from its normal consistence, colour, and odour, the more violent is the cause which occasions the change. Thus, as regards consistence, the discharge from the bowels may be fluid, though fœculent, often resembling pea-soup, the characteristic stools of active typhus. They may be watery from excessive discharge of serum, following congestion of the vessels, or occasioned by saline and drastic cathartics. In cholera they resemble rice-water, being largely mingled with pure desquamated epithelium. They may present shreds of glairy mucus, which is very common in females with uterine disease, and sometimes masses of recently coagulated exudation, or a substance like white of egg. In colour they may be paler than natural in every degree, so as at length to be clay-coloured or almost white, indicating a diminished quantity of bile. They may be red, reddish-brown, grass-green, or absolutely black, according as blood has been poured into the intestine more or less near its outlet, or as chemical changes have occurred in it before being discharged. In other cases it may be of a dark leaden hue, or of a dirty yellow more or less resembling pus. If pus and blood appear in the stools almost pure, then these fluids have been poured out not far from the orifice; the more they are mingled with fœculent or fluid matter, the more is their origin distant. Constant fluid stools of a uniform colour are generally derived from the small intestines. As to odour, the more offensive and putrid, the greater is the indication of absence of bile in some cases, and prostration of the vital powers in others. In the examination of the fœces the microscope will be found of the greatest service. (See p. 87.)

The morbid anatomy of dysentery and of enteritis generally is a most extensive subject, for which I must refer you to the various special works which treat of it. It will suffice to say that the seat of the exudation is for the most part the areolar texture below the basement membrane, but pressing principally on the mucous surface, and giving rise to hemorrhages, ulcerations, purulent discharges, etc. If chronic, the muscular coat becomes hypertrophied, causing thickening and rigidity of the intestinal tube. If violent gangrene occurs, the mucous surface after death presents a deep red colour, from congestion of the vessels, mingled sometimes with bright green patches from alteration in the colour of extravasated blood, and at others with brown or blackish sloughs, from decomposition of texture. Typhoid enteritis will be subsequently described (See Fever). Tubercular enteritis is a common complication of phthisis, generally hurrying on the fatal result. Cancerous enteritis is by no means uncommon.

The structural changes observed in the mucous membrane in cases of diarrhœa and dysentery are—1st, Degeneration of the epithelium; 2d, Congestion of the vessels and hemorrhage; 3d, Exudation; 4th, Morbid changes in the various glands.

1. The readiness with which the epithelium is separated from the basement membrane of the intestinal mucous membrane varies much in different animals. For instance, I have found it to be easily separable in dogs, while in cats it is very firmly adherent, a circumstance which explains to a certain extent the different ideas put forth by experimentalists as to the function of the epithelium in digestion. Some maintain that it is cast off so as to admit of endosmose through the naked villus, whilst others maintain that endosmose is carried on through the agency of the epithelial cells themselves *in situ*, which I believe to be the correct doctrine. In man also the epithelium is easily separated, constituting a morbid state of great importance, because if they be the organs of primary assimilation, their absence to any extent must interfere with nutrition. This I consider to be one of the reasons why chronic diarrhœas, and more especially cholera, in which disorder the rice-water stools are for the most part serum, containing desquamated epithelium, are so prostrating to the economy. Of course the interference with nutrition so occasioned will be in proportion to the extent of mucous membrane affected.

2. Great congestion of the vascular plexus, ramified in the villi and around the glands, is one of the most common appearances

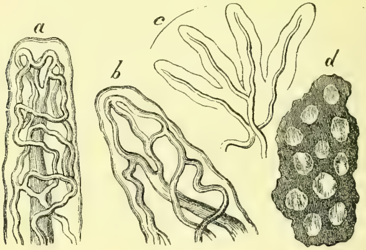

Fig. 381.

Fig. 381. Vascular congestion and sugillation of the mucous membrane of the small intestine in cholera. *a* and *b*, Congested tortuous vessels in villi, which are deprived of epithelium; *c*, The veins only congested in four villi; *d*, Extravasation of blood below the basement membrane, and around the glands of Lieberkuhn.—(*Wedl.*) 50 *diam.*

seen after death in the intestinal mucous membrane, often associated with extravasations of blood more or less extensive. This lesion may be conjoined with all the others to which this texture is liable, and is at once visible not only to the naked eye, but on microscopic observation. In all cases of acute diarrhœa, dysentery, and in cholera, this morbid change may be recognised.

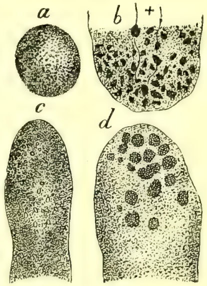

Fig. 382.

3. Exudation may occur below the basement membrane, infiltrating the areolar texture between it and the mucous coat, occupying the villus and surrounding the various glands; or, more rarely, it may appear on the surface of the mucous membrane, presenting adherent coagula. In the former case it undergoes the usual transformations, giving rise, according to circumstances, to purulent collections, fibrous growths, or ulcerations varying in extent, which may or may not ultimately cicatrize. In the latter case the coagulated exudation rarely presents a fibrillated structure, but rather a dense aggregation of fibrinous amorphous substance which disintegrates or passes into pus. Within the villi it often assumes an opaque brownish colour, and passes into granule cells, while the blood which has been extravasated or arrested in the vessels is transformed into black pigment. (Fig. 382, *c* and *d*.)

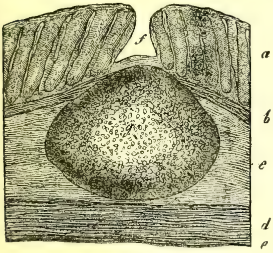

Fig. 383.

4. The morbid changes in the various glands have been more especially studied in relation to typhoid fever, under which head I shall again refer to them. There can be no doubt, however, that the glands of Brunner and Lieberkuhn, as well as those of Payer, are constantly undergoing alterations, probably similar to those so well described by Dr. Handfield Jones in the stomach, although few

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Fig. 382. *a*, Granular mass, in recent exudation on the surface of the intestinal mucous membrane; *b*, Summit of a villus, containing black pigment, at +, in a vessel; *c*, Summit of a villus, containing a brown exudation; *d*, Another villus, with the exudation transformed into granule cells and masses.—(*Wedl.*) 250 *diam.*

Fig. 383. An enlarged Payerian sac from the colon of a child. *a*, Glands of Lieberkuhn; *b*, Muscular layer; *c*, Sub-mucous tissue; *d*, Transverse muscles; *e*, Serous membrane; *f*, Depression of mucous membrane over the sac.—(*Kolliker.*) 50 *diam.*

histological and clinical researches have as yet been made regarding them. In children, in whom the intestinal mucous membrane is active and easily irritated, the shut sacs of Payer are often unusually large. (Fig. 383.)

The treatment of ordinary dysentery, such as we meet with in this country, may be gathered from the cases recorded. It consists, 1st, In careful regulation of the diet, which should be nutritive but unirritating; 2d, In confinement to bed; 3d, In the use of antacids and astringents to check the discharges; and 4th, In the employment of leeches, fomentations, and poultices locally, and of opium internally to relieve pain and diminish irritability. It should not be forgotten, however, that although in consequence of inflammation there may be abundant diarrhœa, this may be conjoined with a true constipation; in other words, the excrement which it is necessary for the body to throw out, may be retained in the cœcum or upper part of the canal, in consequence of the contraction or irritability of the canal lower down. Hence it it necessary occasionally to administer a small dose of castor oil or other mild aperient, to secure the passage of effete matter required by the system, a point in practice requiring great care and experience.

Derangements of the alimentary canal constitute the great majority of children's diseases. In them this portion of the economy is actively engaged, not only in developing itself, but in storing up, by means of digestion and assimilation, an excess of nutritive materials in the blood. During these processes of evolution, the functions of the alimentary canal are especially liable to be disordered, and frequently, as a result of the irritations thereby occasioned, various convulsive or diastaltic affections arise. In all such cases the practitioner should endeavour to remove local irritations and support nutrition. The former is best accomplished by antacid medicines, especially chalk and magnesia, and occasionally a mild aperient, such as castor oil. The latter, by careful attention to the diet, procuring a healthy nurse, etc. The constant flow of saliva during dentition, the vomitings from overdistension of the stomach, and occasional diarrhœa in weak children, are often salutary discharges, which only require watching and hygienic regulation, and will, it is hoped, no longer be mistaken for symptoms of an active inflammation which require antiphlogistic remedies.

CASE LXXVI.*—*Obstruction of the large Intestine—Cancer of Stomach, Liver, Peritoneum generally, and Mesenteric Glands.*

HISTORY.—James Sturgeon, æt. 21, tax collector—admitted into the Clinical Ward of the Royal Infirmary, September 14, 1853. He noticed for the first time last January that his appetite had diminished, and that he was greatly troubled with flatulence, vomiting, and constipation. These symptoms continued until three months ago, when the abdomen became swollen, and gradually so distended, that he applied to Dr. Alison, under whose treatment the vomiting nearly disappeared. He then noticed several hard lumps in the abdomen, varying in size from a walnut to a hen's egg. These, since then, have continued to increase in size, and have become very painful on pressure.

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* Reported by Mr. William Calder, Clinical Clerk.

Progress of the Case.—*October* 26*th.*—Since his admission the appetite has been gradually failing, and he has become daily thinner and weaker. He has experienced considerable pain in the abdomen, combined with a feeling of tightness and constriction there. It has always felt tense, and contained more or less fluid, but until a fortnight ago, the tumours formerly mentioned could be felt very distinctly, separated from the walls of the abdomen by a thin layer of fluid. The bowels have been greatly constipated. The treatment has consisted in the administration of diuretics of every kind, with strong purgatives, enemata, warm fomentations to the abdomen, and occasional anodyne draughts at night. On taking charge of this patient to-day I found his condition as follows:—Great emaciation; complexion of a cachectic waxy appearance; skin cold and dry; tongue moist, with a brownish fur; breath offensive; very little appetite; only occasional vomiting; and no thirst. Bowels have not been opened for four days, a draught of castor-oil with a drop of croton-oil having merely brought away a few hard lumps of fœces of a dark colour. Purgatives do not cause griping. The abdomen is greatly enlarged, and tense, but with a distinct feeling of fluctuation. No tumours can now be felt, but during inspiration distinct friction can be felt by the hand, and heard by means of the stethoscope. Pressure only causes a trifling obscure amount of pain, but his chief complaint is from the sense of constriction. The pulse is 70; regular and feeble. A murmur is audible with the first sound of the heart, at the base; action is regular; no palpitation. There is dry cough and slight dyspnœa. The respiratory sounds are feeble but otherwise seem natural. Urine healthy. From this time he gradually sunk. Œdema appeared in the inferior extremities; vomiting became more severe, and at length constant, whenever food or drink was taken. All kinds of medicines failed even as palliatives; emaciation became extreme, and he sunk *November* 5, the bowels having been obstinately closed.

Sectio Cadaveris.—Forty hours after death.

Thorax.—Pulmonary tissue every where spongy and crepitant. On the superior lobe of the left lung there were two cicatrices, and on the right pulmonary pleura there were similar patches, more widely scattered, extending over the whole of superior, middle, and inferior lobes. Purulent mucus was easily pressed from several of the bronchi. No carcinomatous nodules were found in the pulmonary tissue, but the whole intercostal pleura was studded over with small irregular plates of cancerous exudation, bearing a considerable resemblance to the eruption of small-pox. Heart small; muscular substance pale fawn-coloured. The pericardium shows on its external surface numerous cancerous nodules from the size of a pin's head to that of a small flattened coffee bean. Bronchial glands at the root of lung swollen, some of them the size of a pigeon's egg; all infiltrated with cancer, and some mingled with black pigment.

Abdomen.—The liver was smooth on its surface. Inferiorly and laterally it was closely adherent to the diaphragm, the pleural surface of which was covered by laminæ of cancerous matter. On stripping off the diaphragm the peritoneal covering of the liver was seen infiltrated with cancer, in some places to the depth of half an inch. Substance of liver presented the usual appearances of the white tubercle of Farre; it was pale, soft, and very fatty. The spigelian lobe of the liver, the omentum, epigastric glands, spleen, and pancreas were united together, and formed a large irregular whitish mass extending across the abdomen, and weighing 4 lbs. This mass formed, on the right side, a dense angle pressing in the right iliac fossa upon the ascending colon immediately as it leaves the cœcum ; this bowel was filled, but not distended, with firm yellow fœces, but the ascending, descending, and transverse colon were empty and collapsed. The peritoneum covering the intestine was dotted all over with nodular projecting masses, varying in size from a millet seed to a hazel nut, in colour from white to deep red, and even almost black, and in consistence from soft pulpy matter to nodules considerably indurated. The whole of the abdominal peritoneum was closely covered with similar irregular nodules, for the most part of soft consistence, with here and there a little coagulated blood. There were two gallons of sanguineous serum in the peritoneal cavity. Spleen small, but healthy ; it was closely adherent to the diaphragm above and the cancerous mass below, and on section seemed to be surrounded by a thin layer of cancer infiltrated in the peritoneum *superiorly;* but *below* the cancerous mass all round it is 1½ inch in thickness. Stomach imbedded, and also compressed, in the cancerous mass, which was everywhere adherent to its peritoneal surface. Its mucous membrane, as well as that of the alimentary canal, was quite healthy. On section of the mass it presented the uniform appearance of white lard, giving to the finger a feeling of considerable firmness. It yielded no cancerous juice, but was friable, readily breaking down under pressure.

Microscopic Examination.—The whole of the cancerous exudation on the peritoneum exhibited numerous cancer cells under the microscope, in some places mingled with fibres, in others associated with numerous oil granules and granular cells. The white masses on the pleuræ were principally composed of fibres, but on the addition of acetic acid might be seen to be crowded with cancer nuclei.

Commentary.—In this case it was observable that the vomiting was not regular after taking food, and that the ejected matters consisted of the ingesta, and were never mixed with recently extravasated or altered blood. This indicated that no ulcer or erosion of the stomach had taken place. That the peritoneum and mesenteric glands were the principal textures involved, was also probable from the nodular swellings, the friction audible over the peritoneum, and the abdominal distension from accumulation of fluid. The continued constipation also indicated some mechanical obstacle to the caliber of the gut, obviously owing to cancerous deposition in some way pressing on or constricting it,—all which suppositions were proved to be correct on examination of the body after death.

Case LXXVII.*—*Strangulation of the Small Intestine from Inguinal Hernia—Gangrene, Ulceration, and Perforation of the Intestine—Peritonitis.*

History.—Margaret Bruce, æt. 47—admitted September 25th, 1848. Says that she has occasionally had a swelling in the left groin for the last nine years, that has always gone away on lying down and applying warm fomentations. On the 18th, while carrying a large bucket of water up stairs, she felt something give way in the left groin. On the following morning she suddenly awoke with rigors, shortly followed by nausea and vomiting. The left groin also felt painful, and she perceived a tumour there the size of a man's fist. Purgatives were now taken without causing any action of the bowels. The vomiting, however, became more intense, and the matter ejected more of a dark brown colour. In this condition she has continued ever since.

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* Reported by Mr. T. N. Fanning, Clinical Clerk.

Symptoms on Admission.—On admission she lay on her back, with the thighs flexed on the abdomen. The countenance was sharp, sallow, and expressive of great suffering. Extremities cold. Pulse 120, small and weak. Perspiration difficult, especially during inspiration. Percussion and auscultation of the chest elicit nothing abnormal. Tongue white, but red at the top and edges. Bowels have not been opened for eight days, and there is frequent vomiting of matter like coffee. Skin of abdomen is hot and distended, and she complains of great pain in the umbilical and left iliac regions on the slightest touch. A fluctuating tumour, the size of an orange, occupies the left groin, over Poupart's ligament. Urine scanty, but normal. Menstruation has been irregular. Other functions normal. Mr. Syme was consulted, who opened the tumour, from which there was evacuated about ℥v of fœtid serum, mixed with dirty yellow purulent matter. *Warm fomentations to be applied to the abdomen. To have one grain of opium in the form of pill, immediately.* In the evening the symptoms were the same, with the exception of the abdominal pain, which is more violent, and appears as if she was cut with a sharp instrument. Has had three injections of warm water, which return unaltered. *To have Pulv. Opii,* gr. ij, *every hour.*

Progress of the Case.—*September 26th.*—No change. The opium produces no effect whatever. *Strong beef tea to be taken in small quantities. To eat as much ice as she pleases. Sept. 27th.*—Vomiting, abdominal pain, and intestinal obstruction, continue. Abdomen considerably swollen. Sore in the left groin looks very unhealthy. The thirst and dryness of the lips and fauces are much relieved by the pieces of solid ice. *Has taken opium in three grain doses every second or third hour*, which has caused apparently no effect whatever. *Sept. 29th.* — Vomited matters to-day are distinctly fœculent. The abdomen above the umbilicus and in left flank is greatly swollen, very tender, and tympanitic; over the right lower third it is collapsed. A dirty sanious discharge is poured from the wound in left groin. Pulse 110, very small and weak. Tongue brown and dry. Quite sensible, but much exhausted. Utters low moans, and complains principally of dryness of mouth and throat, which continues to be relieved by the ice. Bowels continue closed, *To have a table-spoonful of wine and beef-tea every hour, and* ℥viij *of beef-tea injected into the bowels slowly, night and morning. Pulv. Opii,* gr. iij, *to be given only at night. Sept. 30th.*—The discharge from the groin to-day is fœculent, as well as the vomited matters. Complains of no pain, but there is commencing delirium. Pulse 100, scarcely to be felt. Prostration extreme. Distension of abdomen, and other symptoms the same. Died *October 1st.*

Sectio Cadaveris.—Thirty-six hours after death.

Body pale and emaciated. Over Poupart's ligament was an oval ulcer, measuring an inch and a half in its longest diameter, which was slightly oblique from above downwards. Its base was superficial, of a brownish-black colour, and fœculent odour.

Thorax.—Slight chronic adhesions between pleuræ on right side. Lungs somewhat emphysematous anteriorly. Thoracic organs otherwise healthy.

Abdomen.—On opening the abdominal cavity, the liver, stomach, and intestines superiorly, were seen to be covered by a uniform membranous expansion of lymph. The remainder of the intestines and the uterus were matted together, and bound down to the left side of the pelvis, leaving a considerable cavity on the right side, which was occupied by about a pint of dirty reddish-brown fluid, possessing a strong fœculent odour. On separating the intestines, a knuckle of the ileum, in its upper third, was found to be strangulated in the left inguinal ring, presenting externally to it, and forming the base of the ulcer, two soft prominent projections. On the summits of these were two ragged ulcers perforating the gut. Into the superior of these a probe only passed a few lines; into the inferior it readily passed into the dilated and upper portion of the intestine. The duodenum, jejunum, and three or four feet of the ileum, up to the point of strangulation, were greatly distended with flatus and fluid fœces, resembling that found in the right side of the peritoneal cavity. The small and large intestines below the strangulation were collapsed and apparently contracted. About eight inches from the strangulation, in the upper part of the gut, was an ulcer the size of a halfpenny, with two perforations in its centre, each about the size of a goose's quill, through which fluid fœces had escaped into the peritoneal cavity. For about eighteen inches, extending from the strangulation, the ileum was of a dark mahogany, and in the centre, as well as near the strangulation, of a claret colour, evidently gangrenous. The rest of the intestines and other abdominal organs were healthy in texture. The gall-bladder was distended with tenacious bile having the appearance of tar.

Commentary.—In this case the intestine had been strangulated in the inguinal ring seven days previous to admission, and the symptoms on her coming into the house were not only those of intestinal obstruction, but of peritonitis also. Purgatives had been administered before she came in. Mr. Syme recognised an abscess external to, and covering the hernia, which was opened without causing relief. In the evening, peritonitis, with symptoms of perforation, were more unequivocally pronounced, and the case became hopeless. Large doses of opium failed to relieve the pain. Ileus was established on the 11th, and an artificial anus on the 13th day, without relief—gangrene and perforation of the intestine having caused escape of fœces into the peritoneum.

The two cases previously given exemplify two modes in which the intestinal canal may become permanently obstructed, viz., by morbid growths compressing it from without, and by the strangulation of a hernial protrusion. An instance of internal obstruction from a band of lymph acting as a ligature, and constricting the gut, will be found among diseases of the ovary. (Case of Jessie Fleming). A variety of other causes may also occasion permanent obstruction, such as invagination, accumulation of fœces or foreign bodies, and calculi impacted in the tube, inflammation, gangrene, paralysis, etc. In most of these cases distension of the upper and corresponding collapse of the inferior portion of the intestine occur, followed at length by ulceration or rupture, occasioning fatal peritonitis. Vomiting is a common symptom of permanent obstruction, and at last the fœces are propelled backwards, and rendered by the mouth, constituting ileus, as in Case LXXVII.

The pathology of this anti-peristaltic action of the tube has been much discussed, more especially whether it be owing primarily to spasmodic contraction or paralysis. In all such cases it has been found that one portion of the intestine has been over-distended, and another collapsed, although a mechanical obstruction does not always exist. A portion of the tube may be inflamed, and even gangrenous, giving rise to ileus, without the passage being actually closed.* In these cases the cause of the obstruction producing ileus is not easy to determine. The reasoning of Abercrombie on this point has always appeared to me so good, that I shall quote it in his own words. "If we suppose, then, that a considerable tract of the canal is in a collapsed state, and that a mass of alimentary matter is propelled into it by the contraction of the parts above, the series of actions which will take place will probably be the following:—When a portion, which we shall call No. 1, is propelling its contents into a portion No. 2, the force exerted must be such, as both to propel these contents, and also to overcome the tonic contraction of No. 2. The portion No. 2 then contracts in its turn, and propels the matter into No. 3; this into No. 4, and so on. Now, for this process going on in a healthy manner, it is necessary that each portion shall act in consecutive harmony with the other portions; but there appear to be several ways in which we may suppose this harmony to be interrupted; (1*st.*) If the portion No. 1 has contracted and propelled its contents into No. 2, and No. 2 does not contract in its turn, the function of the whole will be to a certain extent interrupted, and the contents will lodge in No. 2 as in an inanimate sac. The parts above continuing to act downwards, one of two results will now take place: either the parts above will be excited to increased contraction, and the matters will be forced through into No. 3, independently of the action of No. 2, and so the action be continued; or, new matter being propelled into No. 2, this will be more and more distended, until an interruption of a very formidable nature takes place in the function of the canal. (2*d.*) If, in the series of actions now referred to, No. 2 contracts in its turn, while some obstacle exists to the free dilatation of No. 3, it is probable the motion may be so inverted, that the contraction of No. 2 may dilate No. 1, and that the action may thus be communicated backwards. In the state of parts here referred to, varieties may occur, which appear to give rise to important differences in the phenomena. The obstruction to the dilatation of No. 3 may exist in various degrees; in a smaller degree, it may not prevent it from acting in harmony with the other parts, when the quantity of contents is small, and only a small degree of dilatation is required; but, when there is an increased distension of the parts above, either from increase of solid contents, or from some accidental accumulation of flatus, then a greater degree of expansion may be required than No. 3 is capable of, and, in this manner, interruption may take place to the harmonious action of the canal. It is probably, in this manner, that, in connection with slight organic affections of the canal, we find the patient liable to attacks of pain and other concomitant symptoms, which at first occur only at long and uncertain intervals, but at length terminate in fatal ileus."

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* See Abercrombie on Diseases of the Stomach and Abdominal Viscera.—Cases xxx. xxxi. and xxxvi.

The treatment of intestinal obstruction, however it originates, must always be a matter of anxious consideration. At first it is more or less difficult to determine whether there be only an obstinate constipation, which may be overcome by purgatives, or whether there be a mechanical obstruction, rendering them useless and perhaps dangerous. Under these circumstances, I think one full purgative at least should always be given as a rule, for the simple reason, that not only may its action overcome many forms of simple obstruction, but because without it no one can determine whether or not there is an obstruction at all. As soon, however, as it becomes evident with what we have to do, all attempts to stimulate the action of the canal should cease, and we must have recourse to anodynes to diminish spasm, lessen irritability, and, if possible, cause relaxation. Surgical means must be had recourse to according to the nature of the case, and operations performed with a view of relieving the strangulation, extracting any impacted mass, or dilating the colon with air or fluid, by means of long tubes. These important points, however, are so purely surgical, that I need not dwell upon them here.

INTESTINAL WORMS.

The observations of recent helminthologists, but more especially of Siebold, Van Beneden, Dujardin, Leuckart, Steenstrup, and Blanchard, have cleared away the mystery which has so long hung over the origin of tape-worms and other entozoa. It seems now determined that tape-worms are only further stages of development of Cysticerci, as flukes are only further stages in growth of certain Cercariæ. This important fact is a result of the researches now everywhere prosecuted with so much zeal by anatomists and physiologists in embryology, and from which it has resulted that many animals hitherto considered altogether distinct species, bear the same relation to each other as a caterpillar does to a butterfly.

Professor Siebold first pointed out that the *Cysticercus fasciolaris* found in the liver of the mouse, reaches its ultimate stage of development in the intestines of the cat, and is there transformed into the *Tœnia crassicollis.* This fact was confirmed by a careful series of observations made by Dr. Henry Nelson, who, in his Thesis presented to this University in 1850, carefully traces and figures all the various stages which the tape-worm of the cat passes through. Each joint of this worm is estimated to contain 125,000 ova, which gives for the entire animal about 12,500,000. These minute bodies pass off by the fœces in incalculable numbers, and enter the body of the mouse mixed with its food or drink, or by licking its furry coat, to which they adhere. From the alimentary canal of the mouse they may enter the liver of that animal in three ways: 1st, They may ascend the bile ducts. 2dly, They may pass through the coats of the intestine, and penetrate the adjoining portion of the liver. 3dly, They may bore their way into one of the mesenteric veins, and be carried by the blood along the vena porta to the liver. Dr. Nelson considers the latter to be the most correct view, as he shows that the ova are furnished with temporary teeth, which enable them to pierce the tissues. That they do not perforate the intestine, and so get into the liver, is shown by the fact that they are most developed on the surface of that organ and least so in its interior. Neither are they found especially in the biliary ducts, like the *Distomata.* Hence the blood seems to be the channel of their introduction—an idea still further supported by facts, the number of which is rapidly augmenting, demonstrating entozoa in various stages of development existing in the blood itself. Arrived at the liver, these ova are transformed into *Cysticerci fasciolaris*, and would never proceed further in development in the mouse; but being eaten by the cat, they become tape-worms, and developed into the *Tœniæ crassicollis.*

This series of observations renders it probable that all the various kinds of Tœnia are only advanced stages of development of different Cysticerci. Dr. Nelson points out that "the head of the *Cysticercus cellulosæ* resembles in every respect that of the *Tœnia solium* of man. The two figures given by Bremser are identical, if we allow for the stretching of the neck in the latter. Both have a double circle of hooks, and although the *Tœnia solium* is sometimes found without any teeth, Bremser has fully proved that this is the result of age, and not the original condition. He also observed that as the worm increased in age, one row of the double corona first fell off, and was after a time followed by the other, leaving the worm thus unarmed. The size of the head in both are similar, as also are the attenuated neck, and the gradually increasing body." Besides, man feeds on animals in which these Cysticerci are common, especially on the pig and sheep; and it has been observed that, in countries where meat is often eaten raw, as in Abysinnia, tape-worms are very common. The reason of the rare occurrence of Tœnia in civilized countries, is probably owing to the cooking of food, which destroys the vitality of the Cysticerci. Very well curing or salting meat also appears to produce the same effect. Occasionally, however, it may easily be conceived, that owing to meat being very underdone, or to the tenacity of life in certain of these creatures, (many of them resist a high temperature without injury), they may escape the action of the teeth, arrive living in the human stomach, and be converted into young Tœniæ.

These ideas with regard to the origin of tape-worms have been converted into certainties by the experiments of Dr. Kuchenmeister, first recorded in the *Prague Vierteljahrschrift* (Band i. 1852, p. 126). He fed dogs and cats upon parts of animals which contained different kinds of Cysticerci, and subsequently found the tape-worms into which these had been transformed presenting various stages of development, according as the life of the animal who had eaten the Cysticerci was more or less prolonged afterwards. Every precaution seems to have been used in these experiments, one of which may be cited :—An old dog, during a period of from six to eight weeks, was frequently purged with castor oil, so as to prevent the possibility of tape-worms being present. On the 18th of March 1851, he ate food containing ten Cysticerci; on the 25th he ate as many more; and on the 1st of April, several others which were not numbered. On the 10th of April the dog was killed, and thirty-five Tœniæ were found in the intestines, of which five were from 124 to 390 millimetres (from about 5 to 15 inches) in length, and possessed from 130 to 160 joints. There were six others, from 25 to 96 millimetres (1 to 5 inches) in length, having from 40 to 60 joints. There were 21 others, which measured from 8 to 16 millimetres ($\frac{1}{4}$ to $\frac{1}{2}$ an inch) in length, in which the joints were so indistinct that they could not be counted. Lastly there were three, measuring from 4 to 5 millimetres ($\frac{1}{6}$th of an inch) in length, in which the joints could scarcely be distinguished. Considering the power of contraction and elongation possessed by these worms, their length was not so decided a character of their stage of development, as the size of the head and hooks, which corresponded to the three periods in which the Cysticerci had been swallowed. Similar results have since been obtained in cats; and even in man, Kuchenmeister having given Cysticerci in broth to a condemned criminal, and found tape-worms in the intestinal canal after his death.

On feeding dogs upon the liver of the mouse, containing the *C. fasciolaris*, Dr. Kuchenmeister never found Tœniæ in the intestines. But when he fed cats on the same liver, the intestines contained the *Tœnia crassicollis.* This observation indicates that not only are certain Cysticerci transformed into certain Tœniæ, but that the former require certain habitats, or peculiar animals, in order to undergo this transformation. Although the present amount of our knowledge does not enable us to state from what kinds of Cysticerci many species of Tœnia are formed, it seems probable, from the observations of Siebold, Nelson, and Kuchenmeister, that the *Cysticercus fasciolaris* of the mouse is transformed into the *Tœnia crassicollis* of the cat; the *C. pisiformis* of hares and rabbits into the *T. crassiceps* of the fox; the *C. tenuicollis* of ruminantia and squirrels into the *T. serrata,* so common in the dog; and the *C. cellulosœ* of the pig, sheep, and rabbit into the *Tœnia solium* of man. It is also tolerably certain, from the observations of Eschricht, that the *Bothriocephalus latus* of man, found in certain countries, especially in Russia, is the further development of a species of *Ligula,* which exists in large numbers in the flesh of the dorse, and other fish of the northern seas.

Numerous instances have occurred, especially in India, where men encamped on the borders of a lake have subsequently been attacked by tape-worm, evidently in consequence of the water they consumed containing the ova of the worm. The parasite also has been known to infect Hindoos who have eaten no flesh. There can be little doubt, therefore, that the numerous ova of tape-worms voided by animals may enter the intestines of man with the food or drink, and there be transformed into Tœniæ. This direct mode of entry must not be overlooked while investigating the undoubted origin of the worm from its cystic stage of transformation in the *tissues* of other animals. Dr. Fleming considers that the frequency of measly pork in Ireland is due to the pig being reared in the peasant's cabin, where it has commonly a dog for its companion, which animal almost always is infected with tape-worm, and must void a multitude of minute ova that find ready access to the aliment of the other. "Experiment shows," he says, "that the 'measle' is generated in the muscle of the pig by feeding it with ripe joints of the dog's tape-worm (the *Tœnia serrata*, now considered to be the same as the *Tœnia solium* or human tape-worm), and that the same tape-worm is developed in the intestines of a dog fed with fresh measly pork. The measle is not generated in the dog by feeding it with the tape-worm eggs."* Why in some animals these ova are fully developed into Tœniæ in the intestines, whilst in others they enter the blood and are transformed only into Cystic worms in the liver, brain, or other organs, is probably owing to peculiarities of structure which have not yet been investigated.

The importance of the head of tape-worms, so long recognised by practical physicians as the only certain proof of the complete expulsion of the worm, has also received an explanation from the researches of helminthologists into the anatomy and development of these animals. Notwithstanding the doubts expressed by Van Benedin as to the lateral canals being connected with the digestive system, and his notion of their being peculiar secreting organs, Dr. Nelson in his Thesis has distinctly traced them into the suckers of the *Tœnia crassicollis.* From each of the four suckers a canal descends, which afterwards unite, two and two, to form the lateral canals. He also carefully describes the manner of feeding and propulsion of the contents of these canals from the cephalic to the caudal segment. Hence the head is important as the means by which the animal is nourished.

But the head is further important, as pointed out by Van Benedin, as the part from which all the joints are thrown off by gemmiferous reproduction—those formed first being pushed downwards, and being further developed as they go. Hence why the joints are narrow near the head, and become larger and longer near the tail. The latter after a time separate, but, according to Van Benedin, may still go on developing, and become, he thinks, a species of fluke or distoma. In fact, he considers a tape-worm as a compound fluke-worm, the whole consisting of three stages or periods:—1, The cystic head (*Scolex*);

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* Dublin Quarterly Journal of Med. Science. Feb. 1857.

2, The compound tape-worm (*Strobila*); 3, The separated joints (*Proglottis.*) This latter view, however, is opposed by the observations of Steenstrup as to the development of the fluke, as well as by what we know of the arrangement of the nervous and digestive systems of this entozoon.

The intestinal worms hitherto discovered in man are—the *Ascaris lumbricoides; Tœnia solium; Bothriocephalus latus; Tricocephalus dispar;* and *Ascaris vermicularis.* None of these are very common in Edinburgh, a circumstance which I attribute to the diet of the people, as well as to the excellent quality of the water distributed over the town. In unhealthy children, indeed, Ascarides are occasionally observed, but such children seldom enter the Infirmary. Lumbricoid worms in man are very rarely observed here, whereas in certain districts on the Continent, and especially in the Rhenish provinces, the great majority of bodies I have seen examined contained them in abundance. Tape-worm also is very rare, though sometimes met with, of which the following cases are examples:—

CASE LXXVIII.*—*Tape-worm.*

HISTORY.—James Seth, æt. 35, a weaver—admitted April 7th, 1852. When a boy he used to pass the lumbricoid worms; during the past six months he has also observed ascarides. It is now three years since he first noticed fragments of the tape-worm in his stools. These fragments were then about a foot in length, and were noticed at intervals of months. About twelve months ago the fragments occurred almost every day for six weeks, varying from single joints to a piece six feet in length. No long piece has been passed for three months. No information can be obtained as to the kind of food on which he has lived; but his appetite has remained natural. Before admission he was treated with turpentine by the mouth, and also by injection.

PROGRESS OF THE CASE.—*April 8th.*—To have 25 grains of the ethereal extract of the male shield fern; and in a few hours, a powder containing three grains of calomel, and one drachm of compound jalap powder. *April 9th.*—Several fragments of Tœnia, in single or double joints, or in longer pieces, were passed, being 70 inches in all. They varied in breadth from one-eighth to one-fourth of an inch. *April 22d.*—The dose was repeated on the 10th, but only two or three single joints were found. No further trace of the worm has been obtained by administration of castor oil, and the patient was discharged cured.

Was re-admitted *July 1st.*—States that two months after he left the hospital he again detected joints of the entozoon in his stools. He was at once ordered twenty-four grains of the ethereal extract of the male shield fern, and a subsequent dose of castor oil. Numerous fragments, in all 8 feet in length, were discharged in the next stool. *July 9th.*—The remedy was repeated on the *5th* without further effect. Castor oil has also been administered, but no fragments appear. Patient now states that he has been in the habit of drinking marsh water of impure quality, and of eating salt pork meat. *July 13th.*—Dismissed cured.

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* Reported by Mr. William Broadbent, Clinical Clerk.

CASE LXXIX.*—*Tape-worm treated by the Ætherial Extract of the Male Shield Fern.*

HISTORY.—Catherine Watt, æt. 25, married, with children—admitted November 20th, 1854. She had always enjoyed good health, until three years ago, when joints of tape-worm passed from her involuntarily when out working, and they have continued to pass from her involuntarily, and sometimes in large quantities by stool ever since. On one occasion she passed blood at stool with portions of tape-worm. Has taken various kinds of medicine, but, with the exception of turpentine, does not know what they were. They have all been ineffectual.

SYMPTOMS ON ADMISSION.—On admission, she complained of tenderness in the left iliac region, and of tenesmus when at stool; but with the further exception of the frequent passage of joints of tape-worm, the functions of the body were performed with regularity. She was ordered ℈ij of the ætherial extract of the male shield fern, to be followed in the morning by ℥j of castor oil. This caused the evacuation of seven joints of the worm, each of which were longer than they were broad. Another ℈j dose of the extract was ordered at night, also to be followed by ℥j of castor oil in the morning.

PROGRESS OF THE CASE.—*November 22d.*—Only three joints of the worm passed. To have this evening ʒss of the extract. *Nov. 23d.*—This morning, after taking the oz. dose of castor oil, she passed many separate joints, and several long portions of tœnia. The whole together, when measured, was calculated to be about fifteen yards long. One portion was evidently formed of the joints of the worm near the head, as they were broader than they were long, and not above the tenth of an inch in length. Some joints were square, and others longer than they were broad, measuring from half an inch to three quarters of an inch in length. No head could be discovered, though carefully searched after. She remained in the house till the 6th of December; but although she took ʒss of the extract three times, and one dose of ℈ij, no more joints of the worm came away. This woman was freed from the worm for many months, but it subsequently returned,

CASE LXXX.†—*Tape-worm.*

HISTORY.—William Perry, æt. 6, son of a soldier—admitted November 19th, 1855. Has been troubled with the tape-worm since he was two years old. Has passed separate joints often without medicine; doses of rhubarb and jalap have brought away more; the child has also taken turpentine. A year and a half ago he obtained a prescription at this Infirmary, for a medicine which expelled a very large portion of the tape-worm. In six months it was necessary to repeat the same medicine, again with success. But the symptoms have again returned; the child is always hungry and wants drink; complains of pain in his belly, and passes joints of the entozoon per rectum. His food latterly has been plain, consisting of milk, bread, tea, potatoes, and some meat. The meat is boiled for broth, and is shared with him by father and mother, neither of them being affected. He is fond of sugar, butter, and salt.

PROGRESS OF THE CASE.—*November 21st.*—*Ordered 30 grains of ethereal extract of the male shield fern, with a subsequent dose of castor oil.* *Nov. 23d.*—As the remedy was ineffectual, it was increased yesterday evening to one drachm. This morning, an unbroken mass consisting of six yards and six inches of the tape-worm joints was evacuated; the smallest joints were one-fourth to one-sixth of an inch in breadth and length; the head was not found. *Dec. 25th.*—After other two administrations of the extract, and more frequent administrations of castor oil, no further fragments of the tœnia have been procured; was discharged.

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* Reported by Mr. Almeric W. Seymour, Clinical Clerk.

† Reported by Mr. John Glen, Clinical Clerk.

Commentary.—Of all the vermifuge remedies proposed for the expulsion of tape-worm, I have found the ætherial extract of the male shield fern the most effectual—a preparation first proposed by Peschier of Geneva, and since strongly recommended by Dr. Christison. That it readily dislodges large masses of the parasite, has been witnessed by all who have tried it, although in every instance it has not succeeded in permanently preventing a return. This, however, appears to me in great part, if not wholly, accounted for by the circumstance that patients, on being dismissed, return to the same kinds of food from which they originally obtained the ova of these worms. This is very likely to prevail in certain English counties, where bacon and other preparations of pork are common articles of diet among the people. Dr. Paterson of Tiverton has recorded some very obstinate cases, which resisted the action of the male shield fern, of the kousso, and of turpentine.* Now in Devon, pork is a very common article of diet, whilst in Scotland certainly it is not much employed as food. I carefully interrogated the woman, Catherine Watt, as to whether she had eaten pork, and she admitted, that about the time the disease commenced, her husband being out of work, her diet had been very poor, had consisted in some measure of salt pork, and occasionally of rabbits. Whether the *Cysticercus cellulosœ*, commonly found in the flesh of pigs, could have retained its vitality in the salt pork eaten by this woman, cannot of course be stated with certainty. But it is worthy of remark, that the flesh of pork is frequently sold cheap to the lower orders, after it has been laid in brine for a very short period, or been imperfectly cured, so that the tenacious vitality of these Cysticerci, or of the ova of Tœniæ, is by no means necessarily destroyed. Then rabbits are known to be very commonly infested with Cysticerci, so that her indulgence in either kind of animal food may have been the means of introducing Tœniæ into economy.

The general considerations previously given as to the origin and mode of development of tape-worms must render it evident that, whilst by means of vermifuge remedies the practitioner endeavours to expel such as are already formed, his chief reliance, in preventing their return, must be placed on careful attention to the food and drink consumed by his patient.

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* Monthly Journal of Med. Science. July 1854.

PERITONITIS.

Case LXXXI.[*]—*Acute Peritonitis from bursting of Graafian Vesicles in the Peritoneum—Pleurisy—Inter-lobular Pneumonia.*

History.—Margaret M'Guire, æt. 21, a milliner, native of Edinburgh—admitted September 27th, 1855. Had enjoyed good health until the 21st of the month, when, being sent out on a message, while walking she suddenly experienced a sensation as of a stone being dropped into the pelvis (as the patient describes her feeling), immediately followed by intense pain. She went immediately to bed, but was prevented from sleeping by the intensity of the pain, which increased in severity. At first felt only in the lower part of the abdomen, it gradually spread upwards towards the upper part of the cavity, but has again, within the last day or two, become concentrated in the lower and right part of the hypogastric region.

Symptoms on Admission.—On admission her appetite is entirely lost. The tongue cannot be seen, owing to an old anchylosis of the lower jaw. Lips dry and cracked, with sores on them in places. Vomiting, which greatly aggravates her pain, has followed every attempt to take food since the beginning of the attack. Abdomen somewhat swollen. The hypogastric region is dull on percussion. Diarrhœa has continued ever since she took a dose of castor oil four days ago. Pressure causes intense pain on every part of the abdomen. The breathing is hurried and irregular, entirely thoracic in character. Respiration 24 per minute. No cough. No dulness, on percussing the chest, as far as can be determined; though examination is difficult, owing to the extreme pain which any movement causes the patient. Pulse 124, full and thrilling. Menstruation had been suspended for two months previously, but has come on profusely within the last two days. Has frequent desire to pass water, which is voided in small quantity, attended with great heat and uneasiness. Face flushed; expression anxious; severe headache. *Applicentur Hirudines* xv. *Abdomini. To be followed by hot fomentations.* ℞ *Pulv. Opii. gr.* vi.; *Conserv. Rosar. q.s., ut fiant pill.* vj.; *Capiat unam tertiâ quâque horâ.*

Progress of the Case.—*Oct. 1st.*—The patient has regularly taken the pills of opium; is in a very weak state; breathing laboured; pulse 154. Both purging and vomiting have in a great measure ceased. Conjunctivæ slightly tinged yellow. *To take strong beef tea, and Sherry* ℥iij. *Oct. 2d.*—Patient appears to be sinking; pulse 160, quick and fluttering; respiration laborious and painful; skin cold and moist; abdominal tenderness great; swelling in abdomen rather increased; bowels open this morning; stool free and fœculent. Urine acid; sp. gr. 1020; deep orange coloured, contains a small amount of albumen, is tinged green by nitric acid. Crystals of triple phosphate seen under microscope. *Oct. 3d.*—Patient continued to sink during the night, and died this morning.

Sectio Cadaveris.—Forty-eight hours after death.

The tissues were well nourished; more than one inch of fat in abdominal parietes.

Thorax.—Heart and pericardium healthy. The entire surface of each pleura was covered by an exudation of recent lymph. This lymph was in some places thin, in others nearly a line in thickness; it was soft, and had an unhealthy appearance, being of a dirty yellowish-green colour. There was no fluid effusion in either pleura.

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[*] Reported by Mr. Alexander Simpson, Clinical Clerk.

Left lung, when cut into, presented nothing remarkable. The lower third of the *right lung* presented a singular marbled appearance, in consequence of each pulmonary lobule being surrounded by a layer of coagulated exudation, generally about one-eighth of an inch in thickness. Careful examination demonstrated in fact that the interlobular vessels had poured forth an exudation, which had coagulated outside the lobules, which were œdematous, but not hepatized.

Abdomen.—The whole surface of the peritoneum was coated with lymph, but there was no collection of serum. The lymph in some places was in flakes, in other situations it was of the consistence of thick gruel, closely resembling pus. The coils of the intestines were glued together by lymph; but the exudation was most abundant near the pelvis. The whole of the intestinal canal was carefully removed and examined; there was no appearance of ulceration or of perforation. *Appendix vermiformis* normal. The liver was of a brick-red colour, and was decidedly softer than natural. The kidneys likewise were somewhat softened, but otherwise appeared healthy. The spleen was of pulpy consistence, and broke down under the slightest pressure. The uterus was healthy. The right ovary was about the size of a walnut; on being cut into, its stroma was found somewhat softened; it contained an unusual number of graafian vesicles. Externally there was adherent to the serous covering a layer of firm lymph, so adherent that it could only be removed with difficulty. This apparently originated from the rupture of one or more graafian vesicles, several of which were large on the surface, and filled with sanguineous serum. The left ovary was the size of a small orange, and contained a cyst about the size of a walnut, filled with blood. Such of its substance as remained was of exactly the same consistence as that on the right side. The peritoneum covering it, however, was healthy. The veins in the broad ligaments were examined, but presented nothing unusual.

Commentary.—In this case a young girl, after suspended menstruation for two periods, finds that it comes back profusely, and, when walking, experiences a sudden pain deep in the pelvis. This is followed by excessive agony, pains, and all the symptoms of acute peritonitis. She is admitted on the sixth day. Leeches and fomentations are applied locally, but without any avail. A grain of opium is given every third hour, but without checking the disease. She dies on the eleventh day. On dissection, both ovaries are found enlarged and cystic; but the right one was firmly encrusted with recent lymph, and several cysts immediately below the layer of exudation were enlarged, prominent, and filled with sanguineous serum. The inference obviously is, that one or more of those graafian vesicles had burst into the peritoneum, instead of into the fallopian tubes, and so excited the peritonitis. The cause of the disease spreading to the right pleura and interlobular spaces could not be discovered.

In such a case where the peritonitis is clear and evident from the first, the treatment by quietude, warm fomentations and leeches locally, and opium internally, was indicated and put in practice. But it is rare that purging occurs as in this instance; generally speaking, there is great constipation. Under such circumstances active purgatives should not be administered for two or three days, and then only the mildest remedies of that class, or enemata given. Percussion, by indicating whether the cæcum or rectum are the parts distended with fœces, will occasionally enable us to decide whether an aperient or an injection will be most appropriate. Other cases occur where from acute symptoms being absent, and local tenderness obscure, active purgation is often practised, to the detriment of the patient. This is very apt to occur when acute peritonitis is combined with jaundice and liver disease. The treatment of such cases is most difficult, as the means requisite for overcoming obstruction in the gall ducts are those which we should avoid in peritonitis. In cases arising from perforation of the stomach and intestines, the utmost caution is required (which cannot be too often enforced) before stimuli and purgatives are given. (See Cases LVII. and LVIII.)

Although in the vast majority of cases, peritonitis arises from some lesion of the abdominal organs, which as in the present case affects the serous membrane secondarily, it sometimes happens that no lesion can be discovered after death, although the symptoms of perforation may have existed during life. In such cases the inspection should never be concluded without a careful examination of the appendix vermiformis, where I have seen minute perforations which would otherwise have escaped notice. Besides being exposed to all the ordinary diseases of texture, it is especially liable to have impacted in it grains of wheat, barley, or other kind of seed, cherry stones, pins, and a variety of foreign bodies, which pass readily through the other portions of the intestines, but which in the appendix give rise to ulceration, perforation, and fatal peritonitis.

Although our first efforts in cases of peritonitis should be directed to relieve pain, maintain quietude, and diminish peristaltic action by means of opium, we must not lose sight of the necessity of favouring such transformations in the exudation as will cause absorption or chronic adhesions. All exhaustive remedies therefore are to be avoided, and as soon as the circumstances of the case admit of it, nourishment and, if necessary, stimuli should be administered.

CASE LXXXII.*—*Tubercular Peritonitis with great Deposit in Parietal Layer—Tubercle and Hepatisation of Lungs—Pleuritis—Adherent Pericardium—Commencing Fatty Degeneration of Heart—Biliary Congestion and Fatty Degeneration of Liver—Slight Leucocythemia.*

HISTORY.—Elizabeth Barker, æt. 17—admitted October 6th, 1854. Single. Employed in a factory. She has been ill for eight months. In the month of February last she was attacked with a "fever," which she attributes to working in a cold and damp room. This confined her to her bed, and she was under medical treatment for two months, at the end of which time she was much better. A fortnight afterwards she was attacked with pain in the lumbar region and left side, and with a dry cough, and she did not pass so much water as usual. Her abdomen and legs also became swollen. She took medicines, which partially removed the swelling. She came to Edinburgh three weeks ago, and since then the swelling in the abdomen and legs has been gradually increasing.

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* Reported by Mr. Almeric W. Seymour, Clinical Clerk.

Symptoms on Admission.—On admission, urine scanty and high-coloured; sp. gr. 1030; does not contain albumen. She has never menstruated. Complains of pain over the lumbar vertebræ, increased by pressure. Tongue moist and furred, appetite impaired. Has a sour taste in mouth, and is troubled with flatulence. Bowels costive. Cardiac sounds normal. Pulse 128, small and thready. A friction sound is audible over the inferior part of both lungs, anteriorly, posteriorly, and laterally, with dulness on percussion, and diminution of vocal thrill. In the upper part of right lung, anteriorly and posteriorly, the respiratory murmur is audible, with slight increase of vocal resonance. Over upper part of left lung anteriorly, the natural respiratory murmur is audible, but posteriorly there is a marked increase of vocal resonance, with tubular breathing. Posteriorly œgophony at the angle of right scapula. Skin moist, of natural temperature. ℞ *Hyd. Protoiodid. gr.* vj; *Ext. Hyoscyami* ʒss; *Conserv. Rosar. q.s. ut fiant pill.* xij. *Sumat* j *bis die.* ℞ *Sp. Æth. Nitrici* ℥iss; *Tr. Scillæ; Tr. Digitalis* āā ʒij. *M. Sumat* ʒj *ex aqua indies.*

Progress of the Case.—*October* 11*th.*—Dyspnœa continues. Pain in abdomen increased. Has been suffering from purging for the last 24 hours. *To take chalk mixture with Morphia. Oct.* 14*th.*—Six leeches were ordered to the sternum yesterday. To-day the friction sound has disappeared. *To have* ℥ij *of port-wine. Nov.* 1*st.*—The distended abdomen measures 32¼ inches. Fluctuation distinctly felt. Vertical hepatic dulness 2¾ inches. Dull pain in hepatic and right lumbar region, but no tenderness, as it can be handled and pressed freely without causing inconvenience. Feet œdematous. Sweats considerably. ℞ *Potass. Acetat.* ʒij; *Sp. Æth. Nitrici* ℥ss; *Mist. Scillæ* ℥viss. *M. Sumat* ℥ss *ter indies. Omittantur alia. Nov.* 12*th.*—Quantity of urine much increased. Abdomen measures 31 inches. *Nov.* 22*d.*—Abdomen measures 30½ inches. *Nov.* 25*th.*—Fluid in abdomen much diminished. Swelling and tension of its walls greatly decreased. Circular measurement 29 inches. On palpation a distinct hardness may be felt in the right hypochondriac region, extending into the epigastrium. Tongue dry and brown. Has been suffering from diarrhœa for some days past. The stools have of late been clay-coloured, and slight jaundiced tint of skin has made its appearance. Urine contains bile, and is slightly coagulable by heat and nitric acid. *Blood* presents a slight increase in number of white corpuscles. *To have a starch enema with Tinct. Opii. Nov.* 26*th.*—Much worse. Skin cold. Face sunken and pale. She lies on left side; any other position causes great dyspnœa. Respiration 36 to 40 per minute. Coarse crepitation may be heard over the whole right side. Pulse 120, very weak. Diarrhœa continues, but stools this morning were fœculent. Urine dark brick red; sp. gr. 1012, with some traces of bile. Not a trace of chlorides present. *To have the enema repeated immediately, and* 3 oz. *of brandy. Nov.* 26*th.*—She gradually sank, and died to-day at 10 P.M.

Sectio Cadaveris.—November 28*th.*

External Appearances.—Body emaciated. Abdomen somewhat distended.

Thorax.—The *pericardium* was universally adherent. The adhesions were firm, and were broken down with difficulty. The valves of the *heart* were healthy, but the muscular substance was of a brownish-red colour, and rather softer than natural. The size of the heart was normal. There were firm old adhesions over the upper lobe of the *right lung*. Over the lower lobe there was a thin layer of recent lymph. Between the diaphragm and the base of the lung was a pouch containing about six ounces of turbid fluid, in which floated some flakes of lymph. The whole lung felt firm and dense. When cut into, it presented a somewhat granular surface of a red colour, was scarcely crepitant, broke down readily, and some portions of it sank in water. Scattered through it were a number of yellow masses, from the size of a millet seed to that of a small pea. They were of cheesy consistence, and were pretty readily broken down. They were scattered equally through the pulmonary substance, and were not more abundant at the apex than elsewhere. None were softened. The *left lung* was universally adherent, but there was no recent lymph. The lung felt firm, and when cut into presented altogether the same appearance as the right lung. The same yellowish masses were scattered through it. The bronchial glands were enlarged, and when cut into were found to contain yellow, cheesy, tubercular matter.

ABDOMEN.—The cavity of the abdomen contained about a gallon of yellowish tolerably clear fluid. The parietal peritoneum was very much thickened by a deposit, varying from about one line to half an inch in thickness. It was of a yellowish colour, but, on looking closely into it, numerous opaque points, of the size of pins' heads or so, were seen separated from one another by a clear substance. On cutting into the deposit, this appearance was still more distinct. Numerous blood-vessels were seen on its surface, and in its substance; and on the former were numerous particles of extravasated blood of a bright red colour. The deposit was of firm consistence. The coils of the *intestines* were firmly adherent by tolerably firm lymph. Their coats were softened, so that, in endeavouring to separate the adhesions, they tore readily. On looking closely at the surface of the intestines, numerous small, semi-transparent, yellowish-white deposits were seen on the serous surface, and there presented all the usual characters of tubercle. The mucous coat of the intestines was healthy. The capsule of the liver was thickened, and the upper and anterior part of it was adherent to the diaphragm. The liver was externally of a yellow orange colour. On cutting into it, numerous opaque yellowish-white masses varying from the size of a pin's point to that of a millet seed, were seen surrounded by deep orange-coloured matter. The surface of the section was quite smooth; the tissue of the liver was rather softer than natural; and there did not appear to be any increase in the amount of fibrous tissue. The liver was small and weighed 2 lb. 7 oz.; sp. gr. 1051. The gall bladder was small, its coats were thickened, and it was bound down to the liver by fibrous tissue. It contained about two drachms of orange-coloured bile. The spleen was natural. Mesenteric and lumbar glands enlarged, of white appearance, of a smooth surface on section, yielding a copious opaque juice on pressure. The kidneys presented nothing unusual.

MICROSCOPIC EXAMINATION.—The muscular fibres of the heart had lost, to a certain degree, their striated appearance, which was replaced in some by granular fatty matter. The masses of deposit in the lungs presented all the usual characters of tubercle. On examining the thickened peritoneum, large groups of tubercle corpuscles and granular matter were seen to be surrounded and isolated by fibrous tissue. The pale, opaque-looking points in the liver consisted of accumulations of fat, partly free, partly in hepatic cells. The surrounding parts were loaded with yellow biliary matter. There was no increased quantity of fibrous tissue. The tubes and cells of the kidneys appeared quite natural.

Commentary.—This is a characteristic case of so-called tubercular peritonitis, associated with pulmonary tubercle and various other lesions. In a practical point of view, it is to be remarked that the symptoms were wholly different from those in the previous case. There was no abdominal tenderness, no inflammatory fever—and, notwithstanding the large amount of lymph exuded, some of it recent, all the symptoms were those of ascites dependent on atrophy of the liver. In some cases of this disorder, the peculiar doughy feeling communicated to the hand, and the roughened friction perceptible on moving the two peritoneal surfaces over the other, gives an indication of the nature of the disease—a symptom absent in the present case in consequence of the accumulation of fluid. Occasionally the amount of tubercular exudation is very great; I have seen it matting together all the intestines and abdominal viscera in a layer varying from a half to an entire inch in thickness. In such cases also it is frequently observable that whilst the abdomen is loaded with tubercle, the lungs are comparatively free from it.

The mesenteric and lumbar glands in these cases are very apt to become hypertrophied, and the blood to contain an unusual number of colourless corpuscles. In a man, James M'Arthur, who died in Paton's Ward during the summer 1857, these glands were also enlarged. There was an enormous collection of tubercular exudation in the abdomen, which on examination was found to form a layer from one-half to an inch in thickness, glueing the intestines and abdominal viscera together. On demonstrating a drop of his blood under the microscope in the usual way, from twenty-five to forty colourless corpuscles could always be counted in the field of the instrument. (See Leucocythemia.)

CASE LXXXIII.*—*Cancer of various Abdominal Organs and of the Lungs, producing Symptoms of Peritonitis.*

HISTORY.—Christina Galbraith, æt. 52, a fish-cleaner at Newcastle, single—admitted November 29, 1854. The patient states that, until nine months ago, she enjoyed good health, since which time her strength has been diminishing. She has been decidedly ill for the last three months. Her first symptoms were pain in the epigastrium, a feeling of cold, great thirst, anorexia, sickness, and severe night-sweats. The pain in the epigastrium has gradually increased up to the present time. About ten weeks before admission, she noticed that her abdomen began to swell, which has lately gradually increased. Her feet have, for the last five years, evinced a tendency to swell towards evening, in consequence, as she thinks, of her work requiring her to be much in the erect position, and lately they have become more so. Four weeks ago she had an attack of jaundice, accompanied by severe pain in the lumbar and right hypochondriac regions. The colour of the stools is not known, but she thinks her bowels were regular at the time, although she is habitually subject to constipation. A week after its appearance, her bowels became very loose; the stools were fœculent and abundant. On one occasion she passed a considerable quantity of blood, accompanied by what she describes as "great lumps and strings," but of the colour of which she has no idea. At this time she had no vomiting, but felt great pain over the whole of the abdomen, which became very swollen and tense. She improved under medical treatment: the bowel complaint disappeared, and the pain in the abdomen abated. But she does not know how long the attack lasted. During its continuance she also suffered from vomiting; the matters ejected were sometimes of a green, at others of a coffee-ground, colour. The bowel complaint and the pain returned with great severity on her voyage from Newcastle to Edinburgh. She also vomited considerably, and was brought to the Infirmary in a state of great exhaustion, on the evening of the 29th of November.

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* Reported by Mr. O. Beaujeard, Clinical Clerk.

Symptoms on Admission.—On admission she complained of great pain over the epigastrium and right hypochondrium, and generally all over the abdomen; face very anxious; pulse small and quick. Ordered *Wine and Brandy, Tannin and Opium Pills, and four Leeches to right hypochondrium.* Next day was carefully examined. Face and conjunctivæ have a yellowish tinge; countenance anxious, but speech is clear and comprehension quick. She complains both of a continuous and a shooting pain, worse over the epigastrium and over the left side of the abdomen, in the course of the descending colon. The pain felt last night in the right hypochondrium has been diminished by the leeches, which bled well. She lies with greatest ease on the right side, and feels great pain when she assumes the supine position. The abdomen is exceedingly tender on pressure; it is swollen, tense, and tympanitic, permitting nothing deep seated to be felt. Pungent heat, and dryness of skin over its surface. Tongue white, with prominent papillæ, pale, smooth, and glossy at tip and edges. Complains of constant bad taste in mouth; has a burning pain at epigastrium, and most intense thirst, but cannot take cold water, as it causes immediate vomiting, though she does not otherwise feel sick. Appetite entirely gone; bowels have not been moved since her admission. *Urine* diminished in quantity, high-coloured, with a deposit of lithates; the chlorides are present; sp. gr. 1014; she has a sense of heat in passing it. Catamenia last appeared about a month ago. *Pulse* 108, small and weak. Apex of heart beats between fifth and sixth ribs; transverse dulness normal. Sounds normal. *Breathing* mostly thoracic; respirations, 32 per minute; cannot take a full breath without pain; has a short hacking cough. Chest expands equally, but imperfectly. Percussion good, both anteriorly and posteriorly; respiratory murmurs natural. Has headache, tinnitus aurium, and muscæ volitantes. Feels sick and giddy on sitting up. There is œdema of the feet, ankles, and legs. *To have Wine 4 oz., and in the evening a Turpentine and Assafœtida enema.*

Progress of the Case.—*December 1st.*—The enema was followed by two fluid, fœculent, and hard stools. Pain in the abdomen considerable—most felt below the margin of the right false ribs. Complete anorexia. Great thirst; pulse 104, small and hard. *Dec. 2d.*—State much the same; bowels not again opened. Pain in the abdomen being increased, she was ordered *six more leeches to the right hypochondrium, and the following diuretic mixture*—℞ *Potassæ Acetatis* ʒij; *Sp. Æth. Nitrici* ℥ss; Mist. Scillæ, ℥vss M. ℥ss *to be taken three times a day. Dec. 5th.*—Breathing natural; abdomen not so tense and hot; pain greatly diminished; appetite not improved; stools dark but healthy; pulse 96, small and weak. Dense deposits of lithates in urine. *Dec. 10th.*—Pulse 92, very small and weak. No thirst; appetite not improved, abdomen less tense—fluctuation may be distinctly felt. Pain less—most severe on left side. *Dec. 18th.*—Passes very little urine; it is high coloured, and deposits lithates abundantly. Abdomen less tense—measures 33 inches in circumference. It is tympanitic, and fluctuation may be felt. Feet œdematous; bowels regular; no appetite, great thirst; slight catching of the breath. ℞ *Pulv. Digitalis, gr.* iij, *Pulv. Scillæ,* gr. vj, *Ext. Taraxaci, q. s. ut fiant Pil.* vj. *Sumat* j *bis die. Omittantur alia. Dec. 19th.*—Urine much increased in quantity; is very high-coloured; deposits lithates. *Dec. 20th.*—Great pain complained of in lumbar region. Yellowish tinge of complexion increasing. *To apply to the abdomen the Spongio-Piline soaked in Inf. Digitalis of four times the usual strength. Dec. 21st.*—The Spongio-Piline has relieved the pain in the abdomen. Breathes easier. Thinks her urine diminished in quantity. It is of a deep copper colour. Has vomited her breakfast for the last two days, but is not sick otherwise. Bowels regular, appetite not improved; pulse 108, weak. *Dec. 23d.*—Vomiting more frequent; is much troubled with flatulence; tongue pale, smooth, and glossy; bowels regular. *Dec. 25th.—Tr. Iodinii to be painted over* *the abdomen. Dec.* 27*th.*—The iodine caused her great pain, which was, however, relieved by warm fomentations. The swelling of the abdomen and tympanitis, cough and expectoration, have increased; breathing slightly laborious. ℞ *Sp. Æth. Sulph.* ʒiij; *Sol. Mur. Morph.* ℥j; *Mist. Scillæ* ℥iiss. *To be taken in half ounce doses when the cough is troublesome. Dec.* 30*th.*—Abdomen measures 34 inches in circumference. Bowels regular; percussion normal over chest; mucous and sibilant rales heard on auscultation. Coughs much; expectoration abundant, purulent, and tenacious; pulse small and weak; legs and feet very œdematous; urine as before. *Jan.* 2*d.*—Jaundiced tint of skin is growing deeper; distension of abdomen from tympanitis increased; pulse rapid and thready; vomits all her food immediately after taking it, together with a quantity of black matter; thirst great; stools pale-coloured but consistent. *To omit the Squill and Digitalis Pill, and to take Potass Bitart* ℈j *ter indies. Jan.* 4*th.*—Jaundice increases; urine very small in quantity, and contains bile. Swelling of abdomen augmented; great protrusion of lower ribs, but breathing is not much affected. Vomiting continues. There is œdema of feet, legs, and hands; she is getting decidedly weaker. Pulse 96, steady and weak. *Jan.* 5*th.*—Died this morning at 2 A.M.

Sectio Cadaveris.—Fifty-eight hours after death.

The body emaciated; the surface of a moderately yellow tinge; abdomen much distended and fluctuating.

THORAX.—The *pericardium* and *heart* were healthy; there were a few slight old adhesions on the left side of the chest; the *left lung*, when removed, had an irregular feeling from the presence of a number of masses, some immediately under the pleura, others embedded in the pulmonary tissue; the masses visible externally had a circumference equal to about that of a fourpenny piece; their margins were slightly prominent, while they were depressed or flattened in the centre; they appeared of a greyish white colour, and felt firm and hard; on cutting into the lung, pretty numerous masses similar in size could be seen scattered through it; they were generally of a white or greyish-white colour, while some were yellowish, as if stained by biliary matter; most of these masses felt tolerably firm, but yielded on pressure a small quantity of a glairy juice; others, however (which were more opaque-looking than the rest), crumbled down easily under the fingers. The *right lung* was very densely adherent throughout externally; it presented masses similar to those found in the left lung, and others could be felt in its substance; it was not cut into, but was sent entire to the university museum; the pulmonary tissue intervening between the masses was quite healthy. A few of the *bronchial glands* at the root of each lung were a little enlarged, and when bisected were found to contain a substance like that met with in the tumours of the lungs. The *bronchi* were unaffected. One gland in the anterior mediastinum immediately under the upper part of the sternum was of the size of a walnut, and on being divided, was found converted into a mass of almost cheesy consistence, of a yellow colour, rendered mottled by the presence of a good deal of black pigmentary matter.

ABDOMEN.—The cavity of the abdomen contained about a gallon and a half of a clear yellowish fluid. Peritoneal membrane everywhere healthy. The *liver*, which was much enlarged, presented a very irregular appearance, in consequence of the projection from its surface of numerous masses of a whitish-yellow colour, varying from the size of a pea to that of the fist; some were rounded, others of a very irregular form. Only a very few of these masses presented any central depression. When cut into, the substance of the liver was found, to a great extent, occupied by a similar matter; at some places it occurred in small isolated masses, but in general it was found infiltrated in large patches. It was of a yellowish colour; some parts of it, however, were opaque; while intervening portions were clear and semi-transparent, other parts, again, were intermediate between these conditions, the matter was generally tolerably firm, the more opaque parts had a tendency to crumble down. The hepatic tissue itself was of a yellowish colour, and moderately firm. The weight of the entire liver was 7 lbs.; behind the liver a mass of enlarged glands surrounded and compressed the vena cava, the gall-bladder, and common duct; the *vena cava* was somewhat diminished in size; the *gall-bladder* was much contracted, being little larger than an almond, and contained scarcely any bile; on passing a probe from the gall-bladder along the cystic duct, the latter was found quite occluded, a little before its point of junction with the common duct; a probe was passed from the duodenum along the common duct, but both it and the hepatic duct were compressed and contracted; the enlarged glands, when cut into, were found converted into firm yellowish masses, quite similar to that met with elsewhere. The *pancreas* was healthy; the *stomach* felt indurated towards its pyloric end, and on being cut into, a large ulcer was found near the pyloric orifice; it was of an oval form, about 3½ by 2½ inches, its longest diameter being from above downwards; its right margin was about an inch from the pylorus. The ulcer had a hard thickened base, and a very irregular surface from the presence of numerous fungating excrescences of a greyish-white colour. The margins of the ulcer were elevated above the surrounding mucous membrane, but were irregular looking, as if they had been gnawed by some animal. There was no perforation. The rest of the stomach and the duodenum were healthy. Some of the *gastric lymphatic glands*, particularly some of those connected with the lesser curvature, were enlarged and cancerous. The *spleen* was natural. The *kidneys*, when cut into, were of a yellowish colour; their surface was a little irregular, apparently resulting from old cysts; a few cysts were seen in the surface, and also in the cortical portion; several of the *lumbar glands*, lower down than the mass found behind the liver, were enlarged and similarly affected. The *uterus* and *ovaries* were healthy.

Microscopic Examination.—On examining a little of the juice squeezed out of any of the masses above described, tolerably large nucleated cells were found. Many of them presented the usual appearance of cancer cells; others, however, were small, and many nuclei were seen free. In the opaque portions, the cells were less distinct, and there was a large quantity of fatty matter. The cells of the liver contained a good deal of biliary matter, but they were otherwise quite healthy. The kidneys when examined microscopically, also appeared healthy.

Commentary.—This case of cancer of the lungs, liver, stomach, and other organs, when it entered the clinical ward, presented all the symptoms of acute peritonitis, including great tenderness, with distension of the abdomen, fever and increase of urates in the urine, without any evidence on palpation of the nodular swellings found after death, which were masked by the accumulation of fluid and tympanitis, Neither did physical signs indicate the cancerous deposition in the lung, which was so diffused as not to occasion any respiratory symptoms, while such as did exist were explicable by the abdominal disease.

The facts presented in these three cases indicate the uncertainty of our diagnosis of abdominal diseases. The first, it is true, corresponds with the acute peritonitis of authors; but the second had no such symptoms, though there was abundance of exudation; while the third presented all of them in a marked and characteristic degree in connection with cancer of the abdominal organs, and effusion of serum. I never saw a case which better satisfied me of the insufficiency of mere symptoms, for the purpose of arriving at an exact knowledge of a patient's real disease. The history of this case, it is true, indicated the existence of some chronic disease, but all the positive symptoms, after her admission, including extreme tenderness of the abdomen, its distension, tympanitis, constipation, high fever, vomiting, etc., pointed out that the chronic disease of the stomach and other organs had terminated in acute peritonitis. Yet, on examination, peritonitis there was none, only serous effusion, or ascites evidently resulting from the organic disease of the liver obstructing the abdominal circulation. When contrasted with the last case, where the peritoneal membrane was covered with lymph, the present one, where it was healthy, exhibits a remarkable discordance with systematic descriptions of disease. The true exudation had not one of the so-called symptoms of that lesion, whereas, in the last case, there was every symptom, with a perfectly sound peritoneum. I have recorded therefore this case at great length, because the acute symptoms will speak for themselves, and because, when compared with some remarkable cases afterwards to be given of pleuritis without any symptoms at all, it serves, in my opinion, to convince us that many of our existing notions as to the pathology of acute diseases require to be modified. For other examples of peritonitis, see Cases LVII. and LXXII.

SECTION VI.

DISEASES OF THE CIRCULATORY SYSTEM.

Before proceeding to narrate and comment on lesions of the heart and large vessels, allow me to remind you of some of the rules which the laborious researches of many able men have established for your guidance in the diagnosis of cardiac diseases. They are as follows:—

1. In health, the cardiac dulness, on percussion, measures, immediately below the nipple, two inches across, and the extent of dulness beyond this measurement, commonly indicates either the increased size of the organ, or the extent of pericardial distension.

2. In health, the apex of the heart may be felt and seen to strike the chest between the fifth and sixth ribs, immediately below and a little to the inside of the left nipple. Any variations that may exist indicate the altered positions of the apex in disease.

3. A friction murmur, synchronous with the heart's movements, indicates pericardial exudation.

4. A bellows murmur with the first sound, heard loudest over the apex, indicates mitral insufficiency.

5. A bellows murmur with the second sound, heard loudest at the base, indicates aortic insufficiency.

6. A murmur with the second sound, loudest at the apex, is very rare, but when present it indicates—1st, Aortic disease, the murmur being propagated downwards to the apex; 2d, Roughened auricular surface of the mitral valves; and, 3d, Mitral obstruction, which is almost always associated with insufficiency, when the murmur is double, or occupies the period of both cardiac sounds.

7. A murmur with the first sound, loudest at the base, and propagated in the direction of the large arteries, is more common. It may depend,—1st, On an altered condition of the blood, as in anæmia; 2d, On dilatation or disease of the aorta itself; and, 3dly, On stricture of the aortic orifice,—in which case there is almost always insufficiency also, and then the murmur is double, or occupies the period of both sounds. I have also seen cases which satisfy me that it may occasionally depend on roughness of the ventricular surface of the mitral valves, and on coagulated exudation attached to the heart.

8. Hypertrophy of the heart may be independent of valvular disease, but this is very rare. In the vast majority of cases it is the left ventricle which is affected, in connection with mitral or aortic disease. In the former case the hypertrophy is uniform with rounding of the apex; in the latter, there is dilated hypertrophy, with elongation of the apex.

Attention to these rules alone will, in the great majority of cases, enable you to arrive with precision at the nature of the lesion present. In cases in which there may be any doubt, you will derive further assistance from an observation of the concomitant symptoms, such as,—1st, The nature of the pulse at the wrist; 2d, The nature of the pulmonary or cerebral derangements. Thus, as a general rule, but one on which you must not place too much confidence, the pulse is soft or irregular in mitral disease, but hard, jerking, or regular in aortic disease. Again it has been observed that cerebral symptoms are more common and urgent in aortic disease, and pulmonary symptoms more common and urgent in mitral disease.

I have purposely said nothing now of diseases of the right side of the heart, and of a few other rare disordered conditions of the organ, because I am convinced that an appreciation of the rules above given is the best method of enabling you to comprehend and easily detect any exceptional cases which may arise. In truth, however, I have remarked in our examinations at the bedside that your difficulty is, not how to arrive at correct conclusions from such and such data, but *how to arrive at the data themselves*. You have to determine,—1st, By percussion, whether the heart be of its normal size or not; 2d, Whether an abnormal murmur does or does not exist; 3d, If it be present, does it accompany the first or second sound of the heart; and 4thly, At what place and in what direction the murmur is heard loudest. These points ascertained, the conclusion flows from the rules previously given. But no instruction on my part, no reading or reflection on yours, will enable you to ascertain these facts for yourselves. In short, nothing but percussing the cardiac region with your own hands, and carefully listening to the sounds with your own ears, can be of the slightest service, and the sooner you feel convinced of this truth the sooner are you likely to overcome these preliminary difficulties. This is the reason why a series of cases assembled in the ward of an hospital is so valuable. By careful examination of them, you can at once convince yourselves of the accuracy of the facts ascertained to exist by others,—reflect on the probable correctness of the diagnosis formed at the bedside, watch the various complications, and the effects of treatment, observe how, in the fatal cases, by following the rules given, the accuracy of the diagnosis has or has not been confirmed by post-mortem examination.

After you have made yourselves familiar with the ordinary forms of heart disease, you will find that occasionally very puzzling instances occur where the above rules do not apply. These exceptional cases should always be carefully studied. Indeed, this is what is now being done by the cultivators of physical diagnosis throughout Europe, with a view if possible of determining the characters which distinguish disease of the right side of the heart; those indicative of lesions of the pulmonary artery, of chronic forms of pericarditis, of open foramen ovale, of clots in the ventricles or auricles, etc. etc. Well observed cases of these rarer diseases, however, are still too few to enable us to generalize confidently regarding them. I have frequently examined exceptional combinations of signs with the utmost care, and then been denied a post-mortem examination, or again have stumbled on rare forms of lesions after death in cases, where during life sufficiently careful and repeated examination of the physical signs had not been made to secure accuracy. I would strongly advise you to attach little importance to the record of such exceptional cases, and never to record such yourself, unless equal care have been shown in the examination of physical signs and functional symptoms during life on the one hand, and in anatomical investigation after death on the other.

PERICARDITIS.

CASE LXXXIV.*—*Acute Pericarditis—Recovery.*

HISTORY.—Jane Stambroke, æt. 25, servant—admitted January 7th, 1857. Six months ago she entered another ward in the Infirmary, on account of rheumatic pains in the ankle joints. These pains were unaccompanied by general fever, and there is no evidence that the heart was then affected. During the last six weeks, however, she has experienced considerable dyspnœa, palpitations, and uneasiness over the central part of the sternum, increased by active exertion, or on ascending stairs. Five days ago, after exposure to sudden changes of temperature, she experienced towards evening a distinct rigor and increased pain in the præcordia, which compelled her to desist from working, and retire to bed at an earlier hour than usual. The next day she felt somewhat easier, but on the following one the symptoms increased in intensity, and have continued up to the present time. Yesterday evening six leeches were applied, and caused relief, which however was not permanent.

SYMPTOMS ON ADMISSION.—Cardiac impulse is faintly felt between the fourth and fifth ribs. Dulness on percussion, at the level of nipple, extends transversely four inches from the right edge of the sternum, which is its internal boundary. On auscultation a loud double friction murmur is audible, over and limited to the cardiac organ, loudest over the sternum and base. The systolic and diastolic sounds are inaudible in consequence of the loud friction murmurs. Pulse 108, regular and of moderate strength. She cannot lie on either side, and prefers the sitting to the recumbent posture. Says she has a slight cough but no expectoration. Percussion elicits comparative dulness over the two lower thirds of left back, and there is audible over the same space increased vocal resonance and œgophony, without rales. Inspiratory murmur on right side is somewhat harsh, but otherwise normal; is sleepless in consequence of cardiac uneasiness and dyspnœa, which is considerable. Has not menstruated for the last two months, but the other functions are well performed. *Warm fomentations to be constantly applied to the præcordial region.*

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* Reported by Mr. M'Leod Pemberton, Clinical Clerk.

Progress of the Case.—*January 9th.*—The pains and dyspnœa have been greatly relieved by the fomentations. No friction murmur audible. The urine densely loaded with urates. Pulse 80, soft. *Nutrients with wine* ℥ij. *Jan. 10th.*—No pain or dyspnœa. Slight friction sound only audible over right side of cardiac organ towards the base. Transverse dulness there is diminished by a quarter of an inch. Physical signs of left lung the same. No crepitation. Chlorides in the urine abundant. *Jan. 11th.*—No friction audible over heart, but cardiac sounds are distant. From this time she rapidly became well. On the 13th, marked dulness, increased vocal resonance, and œgophony much diminished over left back. On the 18th, the transverse cardiac dulness measured two and a half inches, and there remained only increased sense of resistance on percussion over left back, with slight œgophony. On the 23d, complained of loss of appetite and slight dyspeptic symptoms, which disappeared the following day. On the 27th she walked out and did not experience so much palpitation or dyspnœa as before the present attack. Was dismissed Jan. 31st.

Commentary.—This was a pure case of pericarditis in a rheumatic girl, in which all the symptoms and physical signs were very carefully examined. The disease went through its natural stages with great rapidity. On the fifth day, when she was admitted, there was great distension of the pericardium from exudation, with friction sounds. Then for a day these were absent, probably from the two surfaces being separated by serum. On the seventh day, distension of the pericardium began to diminish, and there was slight return of the friction. From this time there was rapid decline in the area of dulness, which on the fifteenth day was nearly normal. The local pain she experienced was before admission treated by the application of six leeches, but was still present on her admission. Warm fomentations to the part removed it at once, and constituted the only medical treatment she was subjected to in the house. Nutrients of course were given, and a little wine. The pulmonary physical signs were probably dependent on pressure of the lung backwards by the distended pericardial sac.

Case LXXXV.*—*Pericarditis and Endocarditis—Hydropericardium.*

History.—Barney Kilpatrick, æt. 25, a miner—admitted July 8th, 1850. Nine weeks ago he was suddenly seized with dyspnœa and a feeling of weight or dull pain in the cardiac region. A fortnight since, this became much more acute, and has continued up to the time of admission. For five years he has been much exposed to wet and changes of temperature, but never had rheumatism.

Symptoms on Admission.—Cardiac dulness measures three and a-quarter inches transversely, and is limited above by the margin of the third rib. Apex beats between the fifth and sixth ribs, two inches below, and considerably to the right of the nipple. All over the dull region a double friction sound is heard, resembling a roughened bellows murmur, but superficial. Beyond the region of the dulness these murmurs suddenly cease. Action of the heart regular. Pulse 96, regular, small, and feeble, stronger on the right than on the left side. The slightest movement induces pain, extending from the cardiac region down the left arm to the fingers;

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* Reported by Mr. David Christison, Clinical Clerk.

great dyspnœa; no cough or other pulmonary symptoms; no fever; no cerebral symptoms or tendency to syncope.

Treatment and Progress of the Case.—Twelve leeches were ordered to be applied to the cardiac region, and a calomel and opium pill to be taken every six hours. On the 11th, the friction murmurs were much louder at the base than at the apex. The pulse 108; feeble on left side; on the right side it had a double impulse, a pretty strong beat being followed by a weaker one. ℥vj. of blood to be drawn from the cardiac region by cupping, and a pill to be taken every four hours. On the 13th the breath had a mercurial fœtor. Pulse stronger; less dyspnœa; friction murmurs more faint; pain in arm diminished. On the 14th, pulse full; slight fever; six leeches to be applied to the cardiac region; morphia draught at night. On the 15th, friction murmur only heard at the base; anorexia; can take no food; omit calomel and opium pills. 16th.—Friction murmurs have disappeared, but there is a soft bellows murmur with the second sound, heard at the base. 18th.—Had an attack of severe dyspnœa and syncope; pulse 100, regular, but feeble; ℥iv of wine; cardiac dulness increased. 19th.—Orthopnœa; pulse weak and fluttering; a quivering pulsation felt in the cardiac region; faintness; œdema of feet and legs. Stimulants to be freely administered. Died early in the morning of the 30th.

Examination of the body was not allowed.

Commentary.—This was a well-characterised case of pericarditis. At first the endocardial murmur was masked by the friction sounds, but as these disappeared, its existence became apparent. It was observed, that as the mercury affected the system, the friction murmur diminished; but there is every reason to believe that this was not so much owing to absorption of the exudation, as to increase in the amount of serous effusion. To the combined effects of pressure on the heart from liquid without, and incapability of performing its function from incompetency of the aortic valve, the fatal event must be attributed.

Since this case occurred, upwards of seven years ago, I have satisfied myself that the treatment pursued was not judicious, and that the local abstraction of blood, with administration of mercury under such circumstances, are not only useless but injurious. It is true no fair comparison can be drawn between this and the preceding case, inasmuch as here we had undoubted valvular lesion complicating the pericardial one. But this is an additional reason against depletion. I have given it, however, as a fair example of cases that used formerly to be pretty common, but which now, owing to our improved pathological views applied to practice, are somewhat rare. The following case was treated differently.

Case LXXXVI.*—*Acute Pericarditis followed by Acute Double Pneumonia —Recovery—Aortic Incompetence—Subsequent Articular Rheumatism— Sudden Death—Adherent Pericardium—Fatty Enlarged Heart—Thickening of Aortic Valves.*

History.—Jessie Douglas, æt. 22, employed in a paper warehouse—admitted November 19th, 1855. Has never been very healthy; has had several attacks of rheumatic fever, the last being about seven years ago. On the 9th current, after exposure to cold and damp, she was seized with rigors and pain in the back. These disappearing, were succeeded by pain and slight swelling of the knees, lasting only for a few days. During all this time, though ill, she had no headache, vomiting, nor pain in the chest, but the shortness of breath and palpitation to which she is subject became aggravated. She was under medical treatment, and got purgative medicines, but was neither bled nor leeched.

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* Reported by Messrs. Geo. Robertson and R. P. Ritchie, Clinical Clerks.

Symptoms on Admission.—Apex beats distinctly between the fourth and fifth ribs, immediately under and a little to the inside of the nipple ; heart's impulse is heaving, and sensibly moves the whole mamma ; it can be felt but very indistinctly in the normal position ; there is no thrill. Transverse dulness at the level of the nipple 4¾ inches. Heart sounds are exceedingly indistinct, and muffled at the apex but no murmur is heard there. At the base the first sound is almost inaudible, but with the second there is heard a soft blowing murmur. Pulse 80, full, regular, incompressible. Breathing is rather laboured ; respirations are 34 per minute, but regular ; there is slight cough and no sputum. Percussion is everywhere good ; vocal resonance is greater under the left than under the right clavicle ; no rale is audible, but respiration is exaggerated under the right clavicle, and inspiration is blowing under the left. She speaks languidly, does not sleep, and on sitting up feels faint. She is thirsty, and has no appetite ; the bowels are open ; catamenia are regular. Urine is neutral, sp. gr. 1018, not albuminous ; deposits copious urates and phosphates ; contains no chlorides. Patient lies on her back ; cheeks rather flushed ; the skin warm and perspiring ; no pain nor swelling of any joints. *Ordered half an ounce every fourth hour of the following :*—℞ Liquor. Ammon. Acetat. et Aquæ, āā ℥ij.

Progress of the Case.—*November 20th.*—At the apex, the cardiac sounds continue exceedingly indistinct and muffled. At the base, immediately above the nipple, there is heard with each cardiac sound an exceedingly soft blowing noise equal in intensity and duration ; it extends over a considerable space, being heard but very feebly under the right nipple. Immediately under the centre of both clavicles, there is a prolonged blowing noise, occupying the period of both sounds. Pulse 72, full and somewhat jerking ; palpitations are occasionally urgent ; respirations 36, laboured. *Ordered twelve leeches to be applied over the præcordia, and subsequently warm fomentations.* *21st.*—The leech bites bled well. There is great heaving and expansive motion of the whole præcordia ; at the apex murmurs are indistinct—at the base a double blowing murmur, most clear over the head of the sternum. There is no friction audible—no pain, and the palpitations are not increased. Pulse 80, slightly jerking, but weak. She cannot sit up from tendency to faint ; is depressed and exhausted in her aspect. Urine scanty ; still contains no chlorides. *Ordered three ounces of wine with beef-tea* ; *to be kept perfectly quiet.* *22d.*—The skin is covered with moisture ; respirations 46 ; pulse 84 ; still jerking and weak. The apex beats exactly under the fifth rib, a little to the inside of the nipple. At the base there is now a loud creaking which is double, and very loud at the margin of the sternum. Transverse dulness 3¼ inches. *Ordered to discontinue the saline mixture.* In the evening loud friction was audible at the apex as well as at the base, and the apex beat had fallen about two lines below to the inner side. *23d.*—Pulse 72, of same character ; respirations 35. At the base of the cardiac organ, instead of the double friction heard yesterday, there is now a single continuous creaking. The same sound is audible at the apex. *24th.*—Pulse 80, still slightly jerking, but soft ; respirations 36 ; apex as yesterday. There is a continuous churning friction at base ; at the apex it is heard, but less loud and continuous. ℞ *Spir. Æther. Nitrici* ʒiij ; *Tinct. Colchici* ʒj ; *Aquæ* ℥vss ; M. *One ounce thrice a-day.* Also ℞ *Pulv. Opii* gr. iij ; *Extract. Catechu* gr. xv ; *Confection q. s. ut fiat massa in pilulas sex dividenda ; one to be* *taken every sixth hour.* 25*th.*—The same friction murmur; pulse 80; respirations 36; urine is hyperlithic, and still contains no chlorides. 26*th.*—Pulse 82, slightly jerking, more compressible; respirations 32; skin dry and hot; tongue moist; has no appetite; urine the same in character; the friction is less churning and continuous, and occurs more with the first sound. 28*th.*—At the visit to-day, dulness is detected in the left scapular region near the inferior angle, over a space the size of the hand, with crepitation and pealing vocal resonance. Friction in cardiac region is now diminishing both in intensity and duration. *Ordered three additional ounces of wine.* (From this day commenced an intercurrent attack of pneumonia, affecting the left lung, terminating in seven days. Besides dulness, crepitation, and increased vocal resonance, there were on the fourth and fifth days a friction murmur at the base of the left lung. The chlorides began to reappear in the urine on the fourth day. *A blister was applied* (3 X 4) *to the right side anteriorly on the* 29*th, and of the same size to the left lateral region on Dec.* 2*d.*) *Dec.* 2*d.*—On percussion, the transverse cardiac dulness is 3½ inches; the apex beats feebly between the fifth and sixth ribs. At the base, one long rough prolonged sound is heard, and at the level of the nipple this is plainly connected with a second of a friction character. Over the centre of the sternum, on a level with the nipple, this hoarse blowing (or friction ?) is loudest, and is still audible at the right of the sternum within 1½ inch of the right nipple. Pulse 96, still jerking and soft. *Dec.* 6*th.*—Considerable dulness is detected to-day, on the right side from the inferior angle of scapula to the base. Respiration is almost inaudible, and is faintly bronchial. Over area of dulness a little fine crepitation may also be detected on inspiration, and vocal resonance is increased. Pulse 126, soft, jerking; respirations 52; great dyspnœa. (From this attack of pneumonia on the right side, the patient began to recover on the seventh day. Throughout the whole course of it, the chlorides in the urine were abundant; there was little cough or sputum.) *Dec.* 12*th.*—The cardiac friction murmur has totally disappeared from the apex. At the base a blowing murmur is now heard with the second sound, the first sound being free from murmur. 26*th.*—This morning, about 9. 30, the patient having assumed the recumbent position for a few minutes, violent palpitations came on, and forced her to sit up; she felt as if about to faint, and was so agitated as to be almost unconscious. At 11 A.M., the palpitation had somewhat subsided, but the cardiac action was still very violent, shaking the whole person, and causing severe pain in the chest. Pulse almost continuous, beating about 180 times in a minute, jerking, and incompressible; no difficulty of breathing; no affection of the head; face pale and anxious; patient restless, and occasionally moaning. The urine passed soon after this paroxysm is scanty, of brick colour, turbid, clears up on application of heat, but on further heating and being fully acidified a slight coagulum is obtained. From this paroxysm she recovered towards the evening, under the use of *Ammoniated Tincture of Valerian and Sol. Mur. Morphiæ.* 31*st.*—Patient now sits up for about two hours every day, and begins to be very hungry. *January* 1*st.*—Cardiac signs are the same as at last report; at the apex nothing but a dull impulse is heard; at the base there is still the blowing with the second sound. From this date she gradually increased in strength, moving about in the ward and occasionally taking walks in the town. The pulse 90 to 100 per minute; was easily raised to 100 or 120 by excitement. Palpitations also were readily caused by any surprise, lasting for about fifteen minutes, and accompanied by a marked soreness along the sternum. On the 15th of February it is reported no change in the cardiac sounds had occurred. The transverse dulness 2¾ inches; the pulse 96, full and regular, retains its jerking character. Is discharged much relieved on the 17th February.

She was re-admitted (under the care of Dr. Christison) on the 29th of February labouring under an attack of articular rheumatism; she gradually became convalescent, but continued weak, easily agitated, with painful palpitations and threatening of syncope. The blowing murmur with the second sound at the base continued, but the most careful examination, by inspection, percussion, or auscultation, failed to elicit any other physical sign, the dulness being still 3½ inches across. In this condition she continued in the ward, moving about, and in tolerable health, when on the evening of May 14th she suddenly started up with a cry and immediately fell back, pale, gasping, and almost pulseless, and expired within three minutes, notwithstanding the sedulous administration of restoratives and stimulants.

Sectio Cadaveris.—Thirty-nine hours after death.

Thorax.—The pericardium was found universally adherent. The heart was uniformly enlarged, weighing twenty-eight ounces. On passing a stream of water down the aorta, it escaped very freely into the ventricle. On examination the aortic semilunar valves were found thickened and shortened. There were no vegetations on the valves. The auriculo-ventricular orifices, especially on the right side, were a little dilated. The left ventricle was very much dilated, and its walls were fully of the normal thickness. The right ventricle was of normal dimensions. The lungs were congested posteriorly and inferiorly, but were otherwise everywhere natural. The muscular substance of the heart was everywhere of a pale fawn colour, soft and easily broke down under the finger.

Abdomen.—The abdominal organs were natural.

Microscopic Examination.—The pericardial adhesions were composed of well-formed areolar texture, in firm bands aggregated closely together. The substance of the heart presented all stages of the muscular fatty transformation; the fasciculi in most places being brittle and the transverse striæ obscure, while here and there fatty granules were numerous, displacing more or less of the sarcous substance.

Commentary.—This case was carefully observed for nearly a period of six months. On admission it was evident that a pericarditis existed, with such distension of the pericardium, that the two diseased surfaces did not rub upon one another, so as to occasion friction murmurs. The pulse was full and jerking, but the exact character of the valvular lesion could not then be determined. There was also dyspnœa, and with a view of diminishing this and other symptoms, twelve leeches were applied, with the effect, however, of rendering her weak and faint. Wine, nutrients, and quietude were immediately ordered, and subsequently constituted the treatment. The following day the pericardial distension began to diminish, and a returning friction murmur to appear. As the pericarditic signs decreased, the evidence of aortic incompetency became more evident, and latterly a prolonged blowing with the second sound at the base was the permanent sign of aortic valvular lesion. She also suffered from two distinct attacks of pneumonia, one on the left, and then subsequently on the right side, during the whole of which time wine with nutrients were assiduously administered with the effect of conducting her favourably through these formidable complications. All who witnessed the case were satisfied that this woman during these two pneumonic attacks, in both of which were present all the characteristic symptoms and physical signs of the disease, owed her life to good nourishment and stimulants, and that the slightest approach towards an antiphlogistic treatment would have been fatal. It was further observable, that at this time the pulse was full and jerking—many would have called it hard—so that she presented what has frequently been described as the symptoms of an exquisite case of pneumonia; in short, that very group of symptoms in which writers have advised us to bleed largely. I have myself no doubt, that such cases with aortic disease and dyspnœa were, previous to the days of physical diagnosis, regarded as typical examples of pneumonia, bled largely, and served to swell the great mortality which, as we have previously shown, characterised a former practice. Under an opposite treatment, however, she gradually recovered, and became so well (though still labouring under the aortic incompetency with tendency to palpitation), that she insisted on going out. She was so imprudent, however, as again to catch articular rheumatism, and re-entered the Infirmary; the cardiac physical signs and symptoms, however, remaining unchanged. She again recovered, but died suddenly from a fatal syncope. On examination of the body, the correctness of all the facts observed was confirmed, and the nature of the case rendered perfectly clear. The two layers of the pericardium were everywhere adherent; the aortic valves were thickened and incompetent, explaining the persistence of the valvular murmur and jerking pulse; the left ventricle was hypertrophied, as shown by percussion; and the muscular substance of the heart was fatty, accounting for the sudden death.

CASE LXXXVII.*—*Acute Pericarditis supervening on Phthisis.*

HISTORY.—Edward Campbell, æt. 30, a porter—admitted September 5th, 1856. For twelve years has been of very intemperate habits, unsettled in his occupation, and often insufficiently nourished. About one month ago he first noticed a short dry cough, attended with little expectoration till a few days ago, when it became rather copious and yellow. Four days ago, the sputum for the first time was tinged with blood; about the same time the stools became frequent and loose, and severe night sweats appeared. He has been subject for some time to shiverings, but cannot remember any special rigors ushering in the present attack.

SYMPTOMS ON ADMISSION.—There is marked dulness on percussion at the apex of left lung, and laterally in the axillary region. There is also crack-pot resonance over the left front, from the first to the fourth intercostal space. On auscultation, there are coarse moist rales, during inspiration and expiration, over the whole left lung, anteriorly, laterally, and posteriorly, with increase of vocal resonance, amounting to bronchophony superiorly. Over the lower third of the left lateral region, there is friction with inspiration. The right lung gives the normal results on auscultation and percussion. The sputum is copious, frothy, and streaked with blood; considerable dyspnœa; the cardiac organ is healthy; the pulse is 112, rather incompressible; the appetite bad; the bowels are regular; the skin hot; the face of a purplish hue; the patient is emaciated, weak, and lies on his back; does not sleep well; there is great tremulousness of the limbs; the urine is not coagulable, and it contains abundant chlorides; sp. gr. 1020.

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* Reported by Dr. Thorburn, Resident Physician, and H. N. M'Laurin, Clinical Clerk.

Progress of the Case.—*September 5th-21st.*—Has been treated with small doses of antimony, and a blister two inches square over left mammary region. The strength has been supported by nutritious diet and wine, or occasionally gin. On the 11th, the sputum was carefully examined, and yellow elastic tissue was discovered under the microscope. The physical signs on left side are very slightly altered; the rales are less numerous; there is more bronchial breathing. At the right apex there is now dulness, harsh respiration, and occasional crepitation at close of the inspiratory murmur. The fever, though still great, has considerably abated. Pulse generally 120, soft. From Sep. 21st to 30th, the pulmonary phenomena were little altered, although they were subject to remissions, but the diarrhœa which the patient had before only slightly experienced, became very troublesome. *Oct. 1st.*—To day a distinct double friction murmur is audible all over the cardiac region, soft at the base, more coarse and loud towards the apex. The cardiac dulness on percussion is extended—externally it cannot be limited, but internally it reaches to the centre of sternum. No fremitus; pulse 128, feeble, intermittent, and compressible; respirations 36 per minute; voice hoarse; cough painful; sputum purulent; patient weak, but feels no pain anywhere, and expresses himself as being so well, that he is even anxious to go out and see a friend. Has no appetite; the diarrhœa continues. *Oct. 2d* to *9th.*—The pericardial friction continues distinct. There is also pleural friction murmur on the left lateral region more distinct and extensive than on admission; the right side is dull at the apex, with moist rales during inspiration; to-day there are friction sounds during expiration at the right base. *Oct. 9th* to *17th.*—The auscultatory phenomena are unaltered. The moist rales in lung are more coarse and bubbling; dyspnœa is intense; respirations 60 per minute; the face is livid; the pulse more and more weak, becoming imperceptible. *Oct. 17th.*—Died this morning.

Sectio Cadaveris.—Fifty-one hours after death.

The body was emaciated.

Thorax.—The left lung was infiltrated throughout with grey tubercle; at the apex there was great condensation around three or four cavities containing pus, the largest being the size of a hen's egg. Numerous smaller cavities existed throughout the upper lobe, which with the cut bronchi, poured out abundant pus on the texture being squeezed. The right lung was also infiltrated with grey tubercle throughout the upper lobe; at the apex there were two cavities the size of hazel nuts. Its inferior lobe was thinly scattered with the same tubercle, and was greatly engorged with blood and serum. Universal adhesions on both sides. Both layers of the pericardium were covered with villous lymph, generally about one-eighth of an inch in thickness. Between them were about two ounces of serum. The valves and substance of the heart were healthy.

Abdomen.—The abdominal organs were healthy.

Microscopic Examination.—The structure of the villous lymph in this case was very carefully examined, and Fig. 359, p. 278, is a representation of the structure. The villi varied greatly in length and size, and could be perceived by the naked eye. Individually they were of pulpy consistence, consisted of a delicate membrane, covered in many places by layers of pavement epithelium (Fig. 359, *b*). Their substance consisted of an aggregation of fibre cells in all stages of development, several of which were floating loose in the field of the microscope (Fig. 359, *c*). On the addition of acetic acid the whole became very transparent, showing the mere outline of the villi, with fusiform nuclei imbedded in them. Here and there they contained transparent spaces or vacuoles, having in some transverse markings or folds externally (Fig. 359, *a*, *a*). The heart was subsequently carefully injected by Professor Goodsir, and portions of it may now be seen in the University museum, with the layer of lymph nearest the muscle, containing a rich plexus of vessels filled with coloured size.

Commentary.—On the admission of this man (September 5), he was labouring under intense fever. He had cough and expectoration tinged with blood; dyspnœa; livid face; hot pungent skin; pulse 112, firm; dulness, with cracked-pot sound on percussion over left chest anteriorly; and coarse moist rales during inspiration and expiration. These were the symptoms of acute pneumonia in its suppurative stage. On the other hand, the disease was described to have come on a month ago with dry cough; there was no distinct rigor ushering in the attack; and the chlorides in the urine were abundant. Hence it might be a case of acute tuberculosis. His general aspect taught us nothing, as without being robust, he was by no means emaciated. He was treated with gentle salines, in order to moderate the excessive fever; whilst wine, gin, and nutrients were liberally administered to support his strength. This treatment succeeded in somewhat diminishing the fever. On the sixth day after his admission, I carefully examined the sputum with the microscope, and found it to contain abundant fragments of lung tissue, mingled with numerous pus and a few blood corpuscles. This fact first demonstrated the phthisical character of the disease. Subsequently the pneumonic symptoms disappeared; dulness with moist rales became limited to the apices of both lungs, and the thoracic physical signs were only examined from time to time. At the visit of the 1st of October, a double friction murmur was discovered to exist all over the cardiac region, so distinct as at once to satisfy me that pericarditis was already fully established. It was unaccompanied by pain, palpitation, or any local functional symptom whatever, so that, without the physical sign of friction, attention would never have been directed to it. Indeed, about this period, there had been a remission in the febrile symptoms, there was less cough, and he felt so much better that great difficulty was experienced in making him keep his bed, and even retaining him in the house. The phthisical symptoms, however, continued, the diarrhœa became colliquative, exhaustion came on, and he sunk, without having exhibited one symptom of heart complaint in addition to the physical signs. On examining the body, besides the pulmonary lesion, the heart presented a shaggy layer of lymph covering the whole of both pericardial surfaces. These were already vascular, while their surfaces were covered with epithelium, and they must have been actively engaged in absorbing the serum which separated them, which was small in amount. Here, then, we have a remarkable example of a true acute inflammation of a serous surface coming on under our eyes, which was detected by physical signs alone, and was unaccompanied by any functional symptoms whatever. The only treatment indicated in this case was to support the general strength. As there were no local symptoms, topical remedies were evidently unnecessary.

In this case, also, we remark an exception to the general laws, supposed to govern exudations, viz., that in a phthisical person, while tubercle was thrown into the lungs, an inflammatory exudation was thrown out on the pericardium (See Case XLIX. p. 428). Here, however, it was observable that when the pericarditis appeared, his general health had temporarily improved, and he was taking generous diet, a circumstance which, as previously explained, p. 146, may serve to account for the altered constitution of the exuded matter. It must be obvious however from this, as well as from many other observations previously made, that a true inflammation has no necessary connection with robust constitutions, and that it may come on at the close of the most exhausting maladies.

CASE LXXXVIII.*—*Ascites—Anasarca—Adherent Pericardium with Fatty Atrophied Heart—Congested Liver.*

HISTORY.—John Young, æt. 19, a farm servant—admitted April 16th, 1855. Nine months ago he felt pains in the right hypochondrium, and shortly afterwards his abdomen began to swell. Under medical treatment the swelling subsided, returning when medicines were discontinued, and again subsiding under medical treatment. It has increased a third time, and has induced him to apply for admission.

SYMPTOMS ON ADMISSION.—He is a stout person with a protuberant abdomen, no œdema of integument, and very slight yellow tint of the sclerotic. He says there has been swelling of the legs. Tongue moist, and a little coated; appetite good; no dysphagia nor vomiting. The area of hepatic dulness cannot be determined, owing to the dulness of percussion over the abdomen. On percussion, the distension of the abdomen is seen to be owing to an accumulation of fluid which gravitates to the dependent portions. Bowels are regular. Cardiac sounds normal. Area of cardiac dulness is not stated. Pulse 80, of good strength. On auscultation, sibilant rales are heard all over his chest. He expectorates a good deal of tough frothy mucus. Complains of dyspnœa and cough, especially after meals. Urine scanty (only 12 ounces during the last 24 hours), of natural colour, with exceedingly slight trace of albumen. *Is ordered a squill and digitalis pill thrice a day.*

PROGRESS OF THE CASE.—*April 19th.*—Urine not increasing. *Is ordered to apply over his belly, spongio-piline soaked in an infusion of digitalis, four times stronger than usual.* *25th.*—Coughs less, and expectoration is more easy, but urine has not increased. A papular eruption has appeared over abdomen from the action of the spongio-piline. *29th.*—Has had frequent watery evacuations without griping, and with only slight nausea under the action of elaterium, in the dose of one-sixth and one-fourth of a grain. *May 2d.*—The spongio-piline was ordered to be removed, as it appears to cause irritation of the integument. *3d.*—The cardiac sounds are healthy at apex and base. The abdomen is less tense. The upper border of the area of hepatic dulness is not higher than usual. The lower cannot be determined. The urine is not coagulable. *9th.*—Has felt more comfortable; the ascites appears slowly increasing. Is ordered half a drachm of compound jalap powder. *11th.*—Has felt relieved as usual after purgation; the urine is slightly increased. The feet, legs, thighs, and scrotum, are now œdematous. *Habeat Potass. Bitart.* ʒj *ter indies.* *13th.*—The general anasarca is increasing. Dyspnœa is greater. Urine quite free from albumen. Pulse 68, irregular and weak. Bowels costive. *18th.*—Bowels have been kept freely open by the administration of purgatives, chiefly of Extract. Elater., in doses of one-sixth and one-fourth of a grain. Anasarca is not quite so great, and micturition is more easy, notwithstanding the œdematous condition of penis and scrotum. *To take one-drachm doses of Bitart. Potassæ.* 21*st.*—Not so well to-day; feels uneasy in horizontal position; is to get a special pillow for the support of his shoulders and head. Pulse 88, weak and intermittent. 24*th.*—Pulse 84, weak and irregular; urine 24 ounces in 24 hours; sp. gr. 1028; contains no albumen. The abdomen is becoming evidently by degrees more and more distended. 25*th.*—Feels much the same as yesterday; cannot lie down in horizontal position. Urine 27 ounces, not in the least coagulable. 28*th.*—Urine continues to range from 20 to 28 ounces per diem; sp. gr. 1021; no traces of albumen. Feet and limbs enormously swollen. 31*st.*—Urine diminished in amount; cough is pretty severe. Orthopnœa continues; pulse 94, weak and intermittent. Patient is becoming exhausted, does not even take the food for which he has an appetite, from the distressing sensation of the tenseness of his abdomen. ℞ *Spir. Æther. Sulph.; Ammoniæ Sesquicarb,* āā ʒss; *Aquæ,* ℥vj; *one ounce every third hour.* *June* 3*d.*—Died to-day.

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* Reported by Mr. Robert Byers, Clinical Clerk.

Sectio Cadaveris.—Fifty-six hours after death.

Body anasarcous. Face swollen and œdematous; some hemorrhage from the nose. Limbs œdematous; abdomen protuberant and fluctuating; great cadaveric livor.

Thorax.—The right pleura contained nearly two pints of clear serum; the left one pint. The lower lobe of the right lung was compressed and non-crepitant, and the margin of the other lobes emphysematous; otherwise both lungs natural. The pericardium was found to be firmly adherent over the whole surface. It was much thickened, varying from two lines to two and a half, and it was of fibrous or almost cartilaginous consistence. The heart itself was about the normal size, but its walls, particularly those of the left ventricle, were rather thinner than natural, being less than two lines at the apex. The valves and endocardium were healthy; the muscular tissue was of a pale fawn colour.

Abdomen.—Contained three gallons of clear serum. Liver weighed 3 ℔. and 2 oz. Its hepatic vessels were congested, so that the organ presents on section a nutmeg appearance. The spleen soft, weighed 6½ oz.; but was healthy. The two kidneys weighed each 10½ oz.; and were quite healthy. The whole alimentary canal was carefully examined, but with the exception of congestion of the mucous membrane in the lower two thirds of the rectum, was found to be quite healthy. The large arteries and veins of the neck, chest, abdomen, and pelvis, were also minutely examined, and found healthy.

Microscopic Examination.—The striæ in many of the cardiac muscular fibres were indistinct, and numerous minute oil globules were visible within the sarcolemma. The hepatic cells contained somewhat more biliary and fatty matter than usual. But in almost all of them the nuclei could be seen. The renal structure was normal.

Commentary.—The history and symptoms of this man induced me to consider his disease as essentially hepatic. According to his account it commenced with ascites nine months before admission, and was followed by œdema of the legs and general anasarca. On taking charge of the case in May, however, I could not detect any alteration in the size of the liver, or any uneasiness in the right hypochondrium. The heart was carefully examined and found to be healthy, and at no time had he ever complained of that organ. The lungs presented evidence of slight bronchitis, which could never be supposed to have occasioned the dropsy. The urine when scanty contained a slight trace of albumen, which afterwards disappeared. At no time did the case resemble one of Bright's disease, and the kidneys after death were quite healthy. The rapidly-advancing dropsy was the source of danger in this case. As diuretics had no effect, hydragogue cathartics were had recourse to, and although these produced temporary relief, the anasarca went on steadily increasing, and he died. On examining the body, the liver was found to be simply congested, while its structure had undergone little alteration; the pericardium was universally adherent, and somewhat thickened; the lungs collapsed posteriorly, with slight emphysema anteriorly. It seems to me that the congested liver and the chief pulmonary lesions were the results rather than the causes of the anasarca, and that the true origin of the disease must be referred to the cardiac lesion. During life, it is true, there were no symptoms or physical signs to indicate that the heart was diseased. But it became apparent after death that he must have had an extensive pericarditis, and we have previously seen that such may occur without any symptoms at all. This, as in the case of Douglas, led to fatty degeneration of the organ, with atrophy, however, instead of enlargement; and the result was that, instead of dying suddenly as in her case, such slow languor of the circulation was occasioned, as to produce the venous congestion in the liver and lungs, which in its turn occasioned the anasarca. In most cases where enlargement of the heart follows adherent pericardium, I have noticed the existence of valvular disease. In the present case the valves were healthy, and instead of hypertrophy there was atrophy.

CASE LXXXIX.*—*Rheumatic Pericarditis.*

HISTORY.—Jane Beaton, æt. 13, a thin and weak girl—admitted November 30th, 1853. She states that two years ago she was confined to bed for a month with acute rheumatism, some time after which, she cannot say precisely when, she observed that her heart beat very quickly. The impulse also was distinctly seen by her on undressing before going to bed. She has never suffered from any cardiac uneasiness, pain, or dyspnœa, and asserts that she was able to run about as well as the other children at school, until the commencement of the present illness. Three weeks ago, after no unusual exposure to cold, so far as she is aware, she felt weak, lost her appetite, and went to bed early. Next day she could not move in consequence of pain in both hip joints, and in two days the knees, wrists, elbows, and shoulders were also affected. The knees were much swollen, but not red. In eight days the pains abated, and have not since returned. Since then she has been subject to cough, with a white frothy expectoration, but has had no pain in the chest, dyspnœa, or palpitation.

SYMPTOMS ON ADMISSION.—The cardiac impulse is seen and felt in the third, fourth, and fifth intercostal spaces, so low as one and three-fourths of an inch below, and

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[*] Reported by Dr. David Christison, Resident Physician, and Mr. James Walker, Clinical Clerk.

to the outside of the nipple. It is strong, but unaccompanied with fremitus. Percussion causes slight pain. Cardiac dulness was much increased, extending to the right side of sternum, but its exact limits were not determined. All over the cardiac region there was a double friction murmur, appearing close to the ear, and of a fine grating character, but very distinct. Over the manubrium of the sternum is a single blowing murmur, apparently with the first sound. The second sound cannot be heard. Pulse 136, regular, of good strength and somewhat jerking. The chest expands equally on both sides; percussion normal. Respiration harsh and sibilant over right pulmonary apex, over left apex normal. Posteriorly respiratory sounds healthy. She has slight cough, with trifling mucous expectoration. Does not complain of dyspnœa, but the breathing is evidently somewhat accelerated. Tongue clean. Appetite somewhat impaired; slight thirst. Bowels regular. No headache; does not sleep well, but no startings at night. Face flushed; no anxiety of countenance; skin hot and dry; often sweats at night; no œdema of limbs. Other functions normal. *Eight leeches to be applied to the præcordial region, and a sixth of a grain of Tartrate of Antimony to be given in solution every third hour.*

PROGRESS OF THE CASE.—*December* 1*st.*—Pulse more soft. To discontinue the antimony. ℞ *Calomel*, gr. xxiv; *Pulv. Jacobi*, gr. xxiv; *Pulv. Opii*, gr. iii. *M. et divide in chartulas*, xij. *One to be taken every four hours. Dec.* 3*d.*--Friction murmurs much diminished. Cardiac dulness apparently increased. Urine loaded with lithates. Cough continues. ℞ *Sp. Æther. Nit.* ʒiij; *Pot. Acet.* ʒij; *Mist. Scillæ*, ʒvss. *M. A table-spoonful to be taken every four hours. Dec.* 4*th.*—Careful examination determined, that the cardiac dulness measures five inches transversely, commencing half an inch outside the left nipple, and extending across the sternum to an inch and half of the right nipple. Friction is now only audible over the margin of dulness on the right side. A soft blowing murmur is audible, synchronous with the impulse over a space two inches in diameter below the nipple. At the base a harsher blowing is heard, which alternates with the soft murmur at the apex. It is propagated in the direction of the large vessels, and is very audible under the centre of the right clavicle. Pulse 120, soft, and slightly jerking. No pain or dyspnœa. Gums not affected by the mercurial powders, but complains of tormina and slight diarrhœa. *Discontinue the powders, and apply a blister* 3 x 4 *over the sternum. Dec.* 12*th.*—Dulness somewhat diminished. Double friction is again very loud over the base of the heart. *Dec.* 15*th.*—Dulness much decreased; friction has disappeared. *Dec.* 19*th.*—Dulness now only measures three inches transversely across. *Dec.* 28*th.*—Has been doing well, and taking her food regularly. The cough and expectoration have nearly disappeared, and the harshness of breathing on the right side has much diminished. Last night was seized, without apparent cause, with violent palpitation, a sense of suffocation, and coldness of the body, which continued for an hour. *Brandy and sulphuric æther were given, and hot bottles applied to the feet.* To-day she is tranquil as usual. Impulse is undulating between fourth and sixth ribs. The blowing at the apex is more harsh and prolonged. Above the nipple, on a level with the margin of sternum, there is a superficial blowing, occupying the period of both sounds. It is no longer audible under the clavicle. No retraction of the intercostal space over the undulation visible between the fourth and sixth ribs. *January* 14*th.*—Since last report, the attacks of palpitation and dyspnœa have recurred occasionally at night, apparently excited by any unusual circumstance. Puerile respiration still continues on the right side, but all pulmonary disorder otherwise has ceased. There is now heard, both at the apex and at the base, one loud blowing murmur, synchronous with the impulse, occupying the period of both sounds. That at the base is harder and more clanging in character than that at the apex, and ceases suddenly on carrying the stethoscope to the articulations of the third and fourth right ribs with the sternum. Pulse 128, soft.

She is easily agitated; otherwise the same, but says she is better. *Wine* ℥ij *daily*. *March* 18*th*.—Since last report has been greatly better, and has had comparatively few attacks of dyspnœa and palpitation. To-day the impulse is felt distinctly between the sixth and seventh ribs, a little to the outside of a line drawn vertically from the nipple. Over this point a double blowing murmur is heard, that with the second sound being longest and somewhat distant. This blowing increases in intensity and loudness as the stethoscope is carried obliquely upwards towards the sternum, and reaches its maximum over the articulation of the third left costal cartilage with the sternum. At this point the murmur is prolonged, occupying the period of both sounds. It suddenly ceases as the stethoscope approaches the clavicles on both sides, and is inaudible over the large vessels. Pulse 120, of good strength, jerking; no venous pulse. *April* 11*th*.—Has continued the same, but insists on leaving the Infirmary, and is in consequence dismissed.

Commentary.—This was an exceedingly interesting case of pericarditis and endocarditis, the former of which apparently terminated in adhesions, while the latter underwent a variety of organic changes, which were indicated by physical signs, and were carefully recorded in successive examinations. From these it seems probable that there was gradually developed considerable hypertrophy of the left ventricle, the apex of which descended downwards and outwards, whilst the pulse became more and more jerking. The aortic orifice was apparently constricted; and it is curious to observe, that whilst the murmur at the base at first was propagated upwards in the course of the large vessels, it subsequently was propagated downwards towards the apex, and ceased abruptly above at the margin of a certain area. The kind of organic lesion which gradually forming ultimately produced this result, it is useless speculating about, although it must be evident that the aorta itself above the valves could not have been implicated. At one time it appeared to me probable that the pulmonary valves were affected, but a careful consideration of all the circumstances obliges me to negative this supposition. Again the pressure of the pericardial exudation might have produced the murmur at the base. The constant blowing murmur at the apex indicated mitral insufficiency, a lesion which could not have been so intense as the aortic disease, as the murmur was always more soft, and could easily be distinguished from the one at the base. Indeed it seemed as if this remained almost stationary, whilst the aortic lesion at length became the predominant one. I heard some few weeks after her dismissal that this girl was dead, but under what circumstances could not be ascertained. No doubt after the long observation and successive careful examinations this case underwent, much might have been learnt from a post-mortem examination. The disappointment which medical men too frequently experience in this particular, doubtless constitutes an argument with some in favour of supineness, and must at all times tend to check that habit of accurate observation, which is so essential for working out the difficult problems still unsolved in the diagnosis of cardiac diseases.

Pericarditis consists of an exudation into the pericardial sac: the fibrin of which coagulates and attaches itself to the membrane, while the serum is accumulated in the centre. Changes now occur whereby the solid portion, or layer of lymph as it is called, assumes a villous structure and becomes vascular, whereby, in the majority of cases, the fluid is absorbed, and the two false membranes unite to form an adherent pericardium. These changes are described and figured pp. 277, 278. Figs. 358, 359. This result, however, may be prevented by two circumstances:—1st, The exudation may be small in quantity and limited in extent, when it is transformed into fibrous tissue, becomes covered with a true serous membrane, and there is no adhesion with the opposite surface. This constitutes the white patches so frequently observed on the heart in examining bodies after death, and they are equally frequent on other serous membranes. 2d, The amount of exudation may be very great, the distension of the pericardial sac extreme, and the transformation into vascular absorbing villi thereby prevented. Under such circumstances, the mass of fluid remains stationary, passes into pus, or even increases, in consequence of dropsical effusion from pressure on the veins, and a so-called chronic pericarditis, or pericarditis with effusion (hydro-pericardium), is established.

Auscultation and percussion are our guides to a knowledge of pericarditis in the living subject. With their aid the physician, if called in at the commencement, can trace the progress of the disease through the stages of commencing exudation with friction, gradual pyriform enlargement with or without friction, absorption and disappearance of the serum with returning friction and final adhesion of the two surfaces. This was accurately done in Cases LXXXVI. and LXXXVIII. An adherent pericardium, or a limited exudation confined to the posterior surface of the heart, is detectable by means of physical signs with extreme rarity. It is admitted that occasionally a pericardial may closely resemble a valvular murmur, but then the former is superficial, often intensified by pressure of the stethoscope, is not permanent, and is liable to be affected by posture, and by the greater or less energy of the cardiac contractions.

As regards percussion, it is necessary to remember that when the amount of fluid is small, say from two to four ounces, the pericardial sac is not distended but remains flaccid. The fluid gravitates towards the lower end, and produces the appearance represented in Fig. 384. In cases of acute general pericarditis, such as Cases LXXXIV. and LXXXVI., the amount of fluid may reach from ten to twenty ounces, when the pericardium is distended, becomes pyriform with the base downwards, as represented Fig. 385. In such cases it may be determined by percussion, to extend upwards to the top of the sternum, and downwards to below the xiphoid cartilage. It may pass to the right of the sternum on one side, and left of the nipple on the other, more or less displacing the lungs, especially pressing backwards on the left one. In chronic pericarditis or hydro-pericardium, more than three pints of fluid have been found in the sac, in which case the pyramidal form of acute pericarditis is lost, and it becomes globular, as in Fig. 386. In such cases it encroaches so far on the left lung as to push it entirely backwards. The liver and stomach are at the same time displaced downwards to a great extent, by the descent of the central tendon of the diaphragm. Hence the epigastric prominence, and the pain on pressure in the epigastrium, sometimes observed in cases of pericarditis. While the increasing effusion into the pericardium

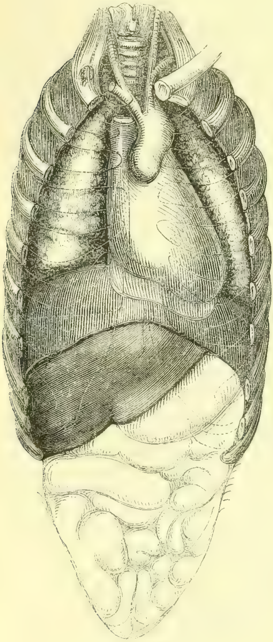

Fig. 384.

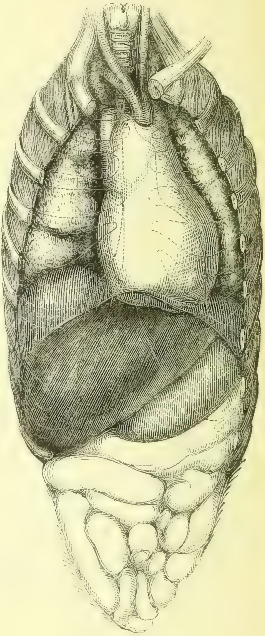

Fig. 385.

Fig. 384. Flaccid pericardium with small amount of fluid.—(*Sibson.*)

Fig. 385. Distended pericardium, of a pyriform shape, as in ordinary pericarditis.—(*Sibson.*)

displaces the lungs, liver, and stomach, it also causes, especially in the young, prominence of the lower sternum and adjoining left costal cartilages, and widening of the left intercostal spaces. If very extensive, it presses backwards and upwards on the bifurcation of the trachea, causing extreme dyspnœa. In such cases, relief is experienced by sitting up and leaning forward in bed, when the pressure on the trachea is removed by the gravitation of the fluid downwards and forwards.—(*Sibson.*) Pressure on the œsophagus may also occasion more or less dysphagia.

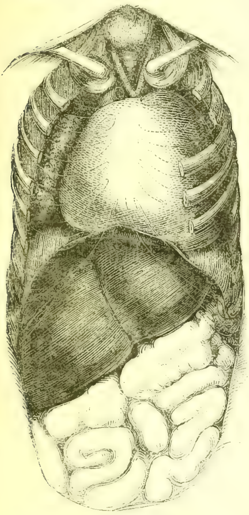
Fig. 386.

Functional symptoms, however they may induce us to suspect, can never alone positively enable us to affirm the existence of pericarditis. They are very variable in different cases, and appear to me to be dependent more on the general susceptibility of the nervous system, than on anything else. Moreover, we have seen that the symptoms of local pain, dyspnœa, and so on, are often absent. In the case of Campbell (Case LXXXVI.) while the friction murmur told its tale with the greatest clearness, he denied that anything was wrong with his heart whatever, and yet after death the two pericardial surfaces were found covered with soft shaggy lymph. In Case LXXXVII., where after death there was adherent pericardium leading to general anasarca, the man could not remember that he ever was affected in any way with cardiac disorder. (See also Case LXXXII.) This important fact has been noticed by many physicians—thus "acute pericarditis is often so latent as to be discoverable only by physical signs."—(*Stokes*). "The disease may be absolutely latent from first to last. I have known patients with several ounces of fluid and exudation matter in the pericardium, grow irritated, when inquiries were made about symptoms connected with the heart."—(*Walshe*). But the cases of Douglas and Young, which have been recorded, must satisfy us that pericarditis is a most serious complaint. The adhesions which form often more or less embarrass the action of the heart, and, above all, impede

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Fig. 386. Excessive distension of pericardium, as in chronic pericarditis or hydropericardium.—(*Sibson.*)

its normal nutrition ; in the one case causing general dropsy, and in the other fatty degeneration of its texture.

Much has been written as to the complications of pericarditis. Its association with acute rheumatism is so common, that some have classified cases into rheumatic and non-rheumatic (*Ormerod*, *Markham*). The causes of this association are as yet unknown. Dr. Taylor further sought to establish a relation between pericarditis and Bright's disease. Thus, out of 38 of his cases, 20 occurred in the progress of acute rheumatism, and ten were complicated with renal disease. It so happens, that in none of my cases of pericarditis, has there been a complication with Bright's disease, and yet this last lesion is so common in Edinburgh, that it is scarcely conceivable, if it were really a cause of the former one, that it should have escaped my notice. Dr. Christison also says, in his work on " Granular Degeneration of the Kidneys," (p. 90), that " pericarditis is seldom seen among the sequelæ." We cannot, therefore, be too cautious in reasoning as to the causes and treatment of pericarditis from the supposed conditions of the blood with which it is thought to be associated. Complications with pleurisy, pneumonia, and pulmonary emphysema are much to be dreaded, especially as regards the ultimate effects on the heart itself, although they may not prove immediately fatal. (See also Cases CIV., CV., and CVII.)

The treatment, like all other forms of acute inflammation, up to a recent period, has at first been antiphlogistic, but for the reasons previously given (p. 274) this is no longer the rule. Case LXXXIV. demonstrates how, in a tolerably healthy person, the disease passes rapidly through its natural progress, and if there be depression of the vital powers, stimulants and nutrients are demanded as in Case LXXXVI. If there be local pain, a few leeches, or, what is often better, warm fomentations or a hot poultice, tends to relieve it. Quietude of body and mind are essential to the treatment. In young persons especially, unnecessary physical examination should be carefully avoided. If the principle of practice formerly put forth be correct (p. 274), viz. that a true inflammation cannot be cut short, and that the only end of judicious medical practice is to conduct it to a favourable termination, we should expect it to be manifested in such a disease as pericarditis. Now this, I think, we do see. Contrast the treatment of Hope with that of Stokes, and what a difference is observable. The former energetic in lowering remedies, the latter cautious, and constantly warning us not to proceed too far. Though he recommends blood-letting, it can only be practised with his consent, at a time, to an extent, and under circumstances when obviously it is least likely to do harm. On the other hand, he points out how, in some circumstances, " even a vigorous action of the heart, a jerking pulse, and an increased action of the carotids, do not necessarily contra-indicate wine ;* and remarks, " that the omission of that active antiphlogistic treatment, still so often employed in the first stages of inflammation, might be of no great detriment to the patient."* For my own part, I am satisfied that there are no circumstances where an antiphlogistic practice can diminish the progress of the disease, whilst in the vast majority of cases it does positive harm, by checking the vital force, so necessary for enabling the patient to struggle through his malady.

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* Stokes on Diseases of the Heart, etc., 1st edit. p. 89.

It has been supposed that the action of mercury has an especial tendency to favour absorption in cases of pericarditis, not only of the serum, but of the organised lymph itself. I have now given it in many cases, two of which are recorded at length (Cases LXXXV. and LXXXVII.), but could never satisfy myself that it had the slightest influence in forwarding or modifying the natural changes which occur. The best evidence on this subject, however, is to be derived from a careful analysis of forty cases of acute rheumatic pericarditis, by the late Dr. John Taylor, in which mercurial ptyalism was produced with the following results :—1st, Ptyalism was not followed by any abatement of the pericarditis in twelve cases. 2d, In *one* case ptyalism was followed by speedy relief. 3d, In *two* cases ptyalism was followed by a diminution, and then gradual cessation of pericardial murmur. 4th, In *one* case pericardial murmur had been diminishing for some days before, and it ceased soon after ptyalism was produced. 5th, In one case pericarditis and pneumonia both increased in extent and intensity after ptyalism. 6th, In four cases pneumonia supervened after the establishment of, and therefore was not prevented by, ptyalism. Was it *caused* by it? 7th, In three cases endocarditis supervened after ptyalism. 8th, In six cases ptyalism was followed by pericarditis. 9th, In one case ptyalism could not be produced, and yet the pericarditis went on favourably. 10th, In two cases ptyalism was followed by extensive pleuritis. 11th, In one case ptyalism was followed by erysipelas and inflammation of the larynx. 12th, In two cases rheumatism continued long after ptyalism was produced.† Thus out of the forty cases only four can be said to have become better after the mercurial action on the system was established, and in these there can be little doubt that it was purely a matter of coincidence. Indeed I have often observed in hospital cases, that when mercury has been said to be most successful, its physiological action has been established just about the time when, during the natural progress of the disease, the friction or blowing murmur may be expected to cease.

It seems to me impossible to reconcile these positive facts with the strong opinions of some eminent physicians as to the good effects of mercury in pericarditis. "If a person," says Graves, "is seized with very acute pericarditis, how unavailing will be our best-directed efforts unless they be succeeded by a speedy mercurialization of the system!" The case of Stambroke (Case LXXXIV.) is alone a sufficient answer to such a remark, not to mention the researches of Louis, who demonstrated that only one out of six cases was fatal when they were left entirely to nature.

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* Stokes on Diseases of the Heart, etc. 1st edit. p. 15.

† Brit. and For. Med. Review. Vol. 24.

Acute pericarditis, therefore, should be treated according to the general principles previously referred to. During the acute febrile symptoms, salines and quietude. If there be much local pain, a few leeches and local warmth. If there be excited action and dyspnœa, æther and morphia, and as early as possible nutrients and wine to support the vital changes which it is necessary for the exudation to go through, so as to favour absorption. Active purgatives should be avoided, and I am by no means sure that blisters are of any avail. My experience induces me to concur with a remark of Dr. Markham, viz. "that rheumatic pericarditis is an inflammation attacking rather those of weak than of strong constitution; that it is much more common in the delicate and young than in vigorous persons at the prime or middle periods of life; that the degree of inflammation, that is, the general febrile reaction and the local exudation, is also greater in them than in the strong; and moreover that the disease is more fatal."*

VALVULAR DISEASES OF THE HEART.

Although morbid anatomists have described a variety of lesions which may cause imperfect action of the valves of the heart, I prefer grouping them together under one head. However they originate, whether from mechanical rupture, from endocarditis, deposits of fibrin, morbid growths, or other cause, they practically amount to the same thing. The disease is imperfect valvular action, and the duty of the physician is to prevent as much as possible the consequences which this is likely to occasion. It is also his duty—while taking every advantage of the laborious efforts which have been made to place the physical diagnosis of those valvular injuries on an exact basis—to remember that perfection is far from having been reached. Careful observations are still required to clear up many doubtful points, and to unravel the difficulties which arise from complication of injuries in the mechanism and vital properties of so important an organ. Hence, notwithstanding, the admirable monographs which have been published on this subject, constant research is necessary, not only to confirm what is already known, but to determine with precision points that are doubtful, and conditions as yet scarcely recognizable. "A time may come," says Stokes, "when the science of diagnosis will be carried to such perfection, that we shall unfailingly determine not only the condition of each portion of the heart, but discover the rise and watch the progress of every intestinal change in its structure, and every mutation of its vitality."† If so, it can only be done by the careful study and analysis of individual cases.

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* Markham on Diseases of the Heart, etc. P. 103.

† Op. Cit., p. 342.

CASE XC.*—*Incompetency of Aortic Valves—Dilated Hypertrophy of Left Ventricle—Dilatation of Ascending Portion of Aortic Arch—Chronic Arteritis with Aneurismal Pouches.*

HISTORY.—William M'Ritchie, æt. 38, fireman on board a Newcastle steamer, entered the clinical ward, complaining of palpitation, dyspnœa, and cough, on the 4th of January 1850. At that time it was ascertained that the cardiac dulness was of unusual extent, and that a blowing murmur existed with the second sound at the base of the heart. He remained in the house under treatment until February 2d, when all the urgent symptoms having left him, he was dismissed. He was re-admitted on the 14th of March, the palpitation, cough, and dyspnœa having returned, together with anasarcous swelling of the abdomen and inferior extremities.

SYMPTOMS ON ADMISSION.—On percussion, the cardiac dulness measures four inches transversely. The apex beats between the sixth and seventh ribs external to the nipple. The carotid and subclavian arteries beat strongly. A loud and prolonged bellows murmur is heard with the second sound, loudest at the base of the heart, and propagated in the course of the large arteries. First sound is normal in character. Pulse 70, regular, hard, and jerking. Respiration hurried; cough and dyspnœa urgent; respiratory sounds on inspiration harsh; expiration prolonged; face livid; pain and dizziness in the head; occasionally loss of vision; disturbed sleep; pulse 90, feeble; nausea and anorexia; abdomen considerably swollen from ascites; inferior extremities œdematous; legs cold.

PROGRESS OF THE CASE.—During April the symptoms continued with more or less intermission. In May he became liable to attacks of syncope, accompanied with angina and palpitations. In the beginning of June it was observed that the bellows murmur with the second sound assumed a rougher character over the arch of the aorta. He also complained of dysphagia and a pulsation in his throat, which obliged him to keep his head in a particular position. On the 14th he was seized with an unusually severe attack of angina and syncope, which in ten minutes was fatal. The treatment consisted principally in the exhibition of a variety of expectorants and antispasmodics, of which a draught containing ten minims of chloroform, and a teaspoonful of Tr. Cardam. c. afforded him most relief. A few leeches were also applied occasionally to the cardiac region.

Sectio Cadaveris.—Forty hours after death.

THORAX.—The pericardium contained three ounces of serous fluid. There was hypertrophy with dilatation of the left ventricle of the heart, in consequence of which the organ weighed 1 lb. 4 oz., and its transverse diameter measured five inches. The mitral valve was healthy. The aortic valves were considerably thickened and curled inwards. Immediately above them the aorta was unusually dilated, the diameter of its caliber being two and a quarter inches. Water poured upon the aortic valves from above passed through the orifice without apparently receiving any impediment. One inch below the origin of the left subclavian there was an aneurismal pouch, the size of a walnut, projecting half an inch from the general outline of the vessel. The arteria innominata, and the origin of the right carotid artery, were also somewhat dilated; and there was an aneurismal dilatation of the aorta opposite the superior mesenteric artery. The aorta, the coronary and several of the larger arteries, were roughened internally by atheromatous deposits. The lungs were emphysematous anteriorly, and œdematous at their apices.

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* Reported by Mr. Hugh M. Balfour, Clinical Clerk.

Head.—Brain pale; slight subarachnoid effusion; cerebral arteries slightly atheromatous.

Abdomen.—Abdominal organs healthy.

Case XCI.[*]—*Incompetency of Aortic Valves—Hypertrophy of Left Ventricle and Auricle—Obstruction and Incompetency of Mitral Valve—Pneumonia.*

History.—Samuel Crawford, æt. 42, employed in chemical works—admitted June 10th, 1850. He has been subject to palpitation and dyspnœa, after any considerable exertion, for four or five years. Last February he had to leave off work on account of these symptoms, which subsided in a fortnight under medical treatment. Three days ago they once more returned. He has noticed, during the last four or five months, swelling of the feet, legs, and abdomen. He never had rheumatism or any other serious complaint.

Symptoms on Admission.—The cardiac dulness measures three inches and a quarter transversely. The apex beats between the sixth and seventh ribs, two inches below and to the left of the nipple. The carotid and subclavian arteries beat strongly. Over the apex a bellows murmur is heard, with both sounds of the heart. Over the base there is a loud prolonged blowing murmur with the second sound, which is propagated in the course of the large vessels. The first sound heard at the base is unusually short and muffled. The pulse is regular, strong, and jerking. He has cough and considerable dyspnœa. Percussion over the lungs is resonant, but, posteriorly and inferiorly, there are fine moist rales. He is liable to giddiness and a feeling of faintness on sudden exertion. Can only sleep in a half sitting posture, resting somewhat on his left side. Considerable œdema of the lower extremities. Other functions normal.

Progress of the Case.—The cough and dyspnœa continued. On the 13th of June the urine became scanty and high coloured. On the 17th there was diarrhœa. Moist and dry rales were heard over a considerable portion of chest, and there was much cough and expectoration. On the 26th the urine was again abundant, but there was general fever, cough suppressed, dyspnœa, and expectoration tinged with blood. Pulse 108, full and hard. Crepitant and mucous rales were heard over the lower portion of the right side. On the 28th all œdema of the extremities had disappeared, but there was decided pneumonia on right side. Low delirium during the night. Died on the morning of the 29th. On the first day ℥x of blood were drawn from the arm with immediate relief, but was followed by sleeplessness and agitation at night. He was then ordered ℥vj of wine daily, and a mixture containing expectorants and diuretics, with tincture of digitalis. Local blood-letting, by means of leeches, was also practised from time to time. The scantiness of the urine and œdema gave way under the use of cream of tartar in ʒj doses three times a-day. When the pneumonia came on, local blood-letting, by cupping to ℥xij, and tartrate of antimony internally were employed, but without success, although the former relieved the dyspnœa.

Sectio Cadaveris.—Forty-eight hours after death.

Thorax.—The pericardium contained four ounces of straw-coloured serum. The heart weighed twenty-three and a half ounces. This increase in size was owing to hypertrophy of the walls of the left ventricle and auricle, and to dilatation of the right ventricle. The aortic valves were fringed with numerous warty vegetations. One of the valves was ruptured, and the ruptured edges were studded over with granules of recent exudation. In consequence of these lesions the valves allowed water to rush rapidly through, when poured on them from above. The septal leaf of the mitral valve was perforated in two places by orifices of sufficient size to admit a crow quill. These orifices were surrounded by vegetations, presenting a funnel-shaped prolongation on the internal surface of the valve, through which the orifice passes. There were several other vegetations on the opposite leaf of the valve and fringing its margin. One of the chordæ tendiniæ was broken across at its valvular attachment, the ruptured or floating end being thickly covered with fibrinous vegetations. Aorta healthy. The lower, middle, and a portion of upper lobe of right lung dense, hepatised, presenting a reddish-gray colour, and yielding sanguineous pus on squeezing the cut surface.

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[*] Reported by Mr. David Christison, Clinical Clerk.

Abdomen.—Abdominal organs healthy.

Commentary.—Both the cases now detailed exhibit very strongly how the rules formerly mentioned, correctly applied, enable us to determine the nature of the cardiac lesion present,—for you will remember that, in both, the lesions named at the head of each case were confidently stated to exist, before the body was examined. In Case XC. "a bellows murmur was heard with the second sound, loudest at the base of the heart, and propagated in the course of the large arteries." Rule 5 tells us that this indicates aortic insufficiency, and on examination such was found to exist. As the case progressed, however, he complained of a pulsation in his throat and of dysphagia; and it is worthy of remark, that not only had an incipient aneurism formed in the arch of the aorta, which explained these symptoms, but that a tendency to the formation of aneurisms existed in other parts of the arterial system. In Case XCI. the diagnosis, though more complicated, and therefore more difficult, was also determined on by paying attention to the same rules. "Over the apex a bellows murmur was heard with both sounds of the heart." Now Rule 6 tells us that this indicates mitral obstruction with insufficiency, and a description of the lesion found affecting this valve after death, must convince us that whilst the vegetations prevented proper closure of the orifice, some of them must also have obstructed the flow of blood in its passage from the auricle to the ventricle. But there was also a bellows murmur with the second sound, heard loudest at the base; and this, as in Case I., is a sign of aortic insufficiency. A careful determination of the cardiac signs, therefore, and an exact appreciation of the facts in the first instance, led us, in accordance with the laws previously generalized, to a correct conclusion as to the nature of this complicated case. No two cases could better convince you of the diagnostic value of physical signs. The treatment in the last case is what I should now consider as far too depletory. On looking back to it after seven years' additional experience, it will be observed that it confirms all that I have previously stated as to the inutility of such practice. The hard pulse of the pneumonia which ushered in death, was evidently caused by the aortic disease, in the same manner that a similar complication in the course of pericarditis was attended with the same symptom. (See Case LXXXVI).

CASE XCII.*—*Incompetency of Mitral Valve.*

HISTORY.—Agnes Murray, æt. 41—admitted June 16th, 1850. About eighteen months ago she first experienced, without any obvious cause, palpitations and pains in the cardiac region, which have continued ever since. They became more violent after exertion, and were accompanied with dyspnœa. Latterly there has been an œdematous swelling of the legs, abdomen, and face. She has had four attacks of hæmoptysis, the first occurring eighteen months, and the last three months, ago.

SYMPTOMS ON ADMISSION.—The cardiac dulness measures two and a quarter inches across. The apex of the heart beats under the sixth rib, below and a little outside the nipple. Over the apex there is heard a harsh bellows murmur, which diminishes in intensity towards the base and large vessels. Pulse 80, weak. Great dyspnœa and palpitations on exertion, and occasional severe pain in the cardiac region. Resonance of lungs natural. Posteriorly, over right lung, loud sibilant murmurs are heard, both with inspiration and expiration. Expectoration abundant. No anasarca at present, or cerebral symptoms.

PROGRESS OF THE CASE.—This woman, under the action of small doses of digitalis and cream of tartar, and the occasional application of a few leeches to the cardiac region, became gradually much better. The palpitations, dyspnœa, and bronchitis disappeared. She was dismissed greatly relieved, July 16th.

CASE XCIII.†—*Incompetency of Mitral Valve—Pulmonary Hemorrhage—Hydro-thorax.*

HISTORY.—Robert Ross, æt. 30, a lath-splitter—admitted June 28th, 1850. For some time past he has occasionally experienced palpitation, and observed now and then slight swelling of the legs. He first became severely ill only seven weeks ago, when he was seized with repeated vomitings, which continued two days. He subsequently caught cold, to which he is very liable, and since then has been labouring under cough, dyspnœa, a feeling of tightness across the upper part of the abdomen, and general weakness.

SYMPTOMS ON ADMISSION.—Cardiac dulness cannot be distinctly defined. The apex beats feebly between the fifth and sixth ribs, two inches below the nipple. A bellows murmur is heard with the first sound over the apex, but much more distinctly three inches to the right of it, near the sternum. It is almost inaudible over the base. The second sound is normal. Pulse 100, small and soft. Considerable dyspnœa and cough; sputa viscid and tinged with blood. No dulness on percussion over the lungs. Sibilant, mucous, and crepitating rales are heard very generally over the inferior parts of chest, both anteriorly and posteriorly. No increase of vocal resonance. The general surface is slightly jaundiced. On careful percussion of the liver, its inferior border presents a prominence, anteriorly the size of an egg, over the pylorus.

PROGRESS OF THE CASE.—Up to the 3d of July he experienced occasional vomiting. The inferior extremities became œdematous, and fluid accumulated in the abdomen. On percussion, the resonance over the right lung is diminished as high as the scapula; there is slight increase of the vocal resonance. On the 8th of July, the surface generally was anasarcous. From the 10th to the 15th, the dyspnœa greatly increased. He expectorated on various occasions mouthfuls of florid blood. Latterly, he could only lie on the left side. The left side of the chest became completely dull on percussion, with absence of respiration. He was now removed from the Infirmary by his friends. Leeches to the epigastrium, with naphtha and anodynes internally, checked the vomiting. The principal object of the treatment, however, was by means of diuretics, to increase the amount of urine, and thereby diminish the anasarca. Pills of lead and opium were also administered to check the hæmoptysis.

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* Reported by Mr. Edmund S. Wason, Clinical Clerk.

† Reported by Mr. David Christison, Clinical Clerk.

Commentary.—The two last cases contrast very strongly with the two first. In both, the bellows murmur was heard only with the first sound, loud over the apex, diminishing towards the base ; and Rule 4 tells us that this indicates mitral incompetency. The concomitant symptoms fully bear out this diagnosis. The pulse was weak,—the pulmonary organs were those disturbed, while the cerebral functions were unaffected. In Case XCII. there was bronchitis, which diminished under appropriate treatment. In Case XCIII. bronchitis also existed, but it was much more general, and mingled with a certain degree of collapse of the lung on the right side. Extravasation of blood into the pulmonary tissue of both lungs had most probably also taken place, as indicated by the hæmoptysis ; and, latterly, the general dropsy which prevailed affected the thoracic cavities, causing hydrothorax on the left side. The man was evidently in a dying condition when his friends insisted on his removal ; and I was rather surprised to hear that he lingered a fortnight before death took place. No examination could be obtained.

CASE XCIV.*—*Mitral Incompetency—Hypertrophy of Left Ventricle—Attack of Acute Rheumatism, followed by Aortic Incompetency.*

HISTORY.—John Conolly, æt. 49, a joiner—admitted June 22d, 1850. He has for some years past been subject to pain in, and swelling of, the joints. Eighteen months ago he was suddenly seized with pain in the cardiac region, unaccompanied by dyspnœa, but followed by severe cough. He has been copiously bled, and undergone a lengthened treatment.

SYMPTOMS ON ADMISSION.—The cardiac dulness measures 2¾ inches across. The apex beats in a hollow between the xiphoid cartilage and the cartilage of the seventh left rib. Heart's impulse strong. A bellows murmur can be heard with the first sound, synchronous with the cardiac impulse. It is loudest at the apex, and diminishes in intensity towards the base. Pulse 74, full and strong. No cough, but considerable dyspnœa on making the slightest exertion. Percussion and auscultation indicate slight pulmonary emphysema anteriorly, but no bronchitis. Slight tinnitus aurium, and dimness of vision occasionally. There is a patch of *psoriasis figurata*, an inch and a half in diameter, on the right cheek and side of the nose.

PROGRESS OF THE CASE.—July 1st, he was attacked with severe articular rheumatism in the hip, knee, and wrist joints, which had entirely disappeared under appropriate treatment on the 9th. On the 14th he had diarrhœa, accompanied by considerable discharge of blood per anum. This continued in smaller quantities from time to time. On the 22d, a careful examination exhibited a change in the cardiac signs. The impulse over the apex was more prolonged, with a deep murmur and jog. The bellows murmur synchronous with the impulse was no longer audible, but one can be heard alternating with it at the base,—that is, with the second sound.

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* Reported by Mr. Charles Murchison, Clinical Clerk.

Great pulsation of the carotid, subclavian, and humeral arteries was seen and felt, and a loud puffing murmur, synchronous with their dilatation, could be heard over them. His general health, however, was greatly improved, the local and other symptoms having disappeared; and he left the house, at his own desire, July 24th. At first he took digitalis for six days, with a view of diminishing the cardiac impulse and pain. It was then suspended on account of the nausea and weakness it apparently occasioned. The rheumatic fever and arthritis were combated by salines, diaphoretics, and venesection to the extent of ℥xij. Afterwards the local pains rapidly yielded to small blisters placed over each affected joint. The diarrhœa and discharge of blood were checked by pills of lead and opium.

Commentary.—This man, after frequent attacks of rheumatism, entered the Infirmary, labouring under hypertrophy, with incompetency of the mitral valve. At the time there was no bronchitis, but he had previously suffered from severe cough and pulmonary derangement. Whilst in the house, one of his acute rheumatic attacks came on. Many of the joints were swollen and exceedingly painful; but this affection yielded to one small general bleeding, tartar emetic internally, and blisters locally, in eight days. The effect of this attack was to give rise to acute endocarditis, which, instead of affecting the auriculo-ventricular orifice formerly diseased, fixed itself upon the aortic valves. The lesion, however, must have been slight—probably limited to a few small vegetations upon the margins of the valve—because the murmur was soft in character, and the incompetency not of such amount as to occasion either cerebral or other functional symptoms. The pulsation in the large vessels, however, was greatly augmented, and there is every reason to fear, that should the incompetency continue (as is most probable), the aorta and cavity of the left ventricle will both become dilated.

CASE XCV.*—*Mitral Incompetency—Hypertrophy of Left Ventricle—Aortic Incompetency and Obstruction—Angina.*

HISTORY.—Edward Monro, æt. 41, a painter, admitted June 24, 1850. Two years ago, without any assignable cause, he was suddenly seized with angina, consisting of severe pain in the middle of the sternum, often running down the left arm, accompanied by violent palpitations. Since then the paroxysms have been increasing both in frequency and intensity.

SYMPTOMS ON ADMISSION.—The cardiac dulness below the nipple measures three and a quarter inches transversely. The apex of the heart cannot be felt to beat at any particular spot. Heart's action is regular. A distinct bellows murmur can be heard accompanying both the first and second cardiac sounds, which are equally loud at the apex and at the base. Both are heard loudest to the right of sternum, opposite the second, third, and fourth costal cartilages. A loud blowing murmur is heard over the carotid arteries. Pulse 74, regular. Has a slight cough, with expectoration. Lungs resonant on percussion, and on auscultation the inspiratory murmurs are louder and rougher than natural, and the expiration is slightly prolonged. He has frequently expectorated small quantities of dark-coloured blood. There is great dyspnœa on making the slightest exertion, and he has occasional severe attacks of angina. There is considerable dyspepsia. Slight dimness of vision, and muscæ volitantes, but otherwise no cerebral symptoms.

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* Reported by Mr. Charles Murchison, Clinical Clerk.

Progress of the Case.—The attacks of angina returned four and five times a-day. They occasioned great agony, profuse perspiration, and increased action of the heart, during which the murmurs were heard louder. There was also occasional nausea and tendency to vomit. On the 8th of July he fainted, being unconscious for five minutes. At this time the murmur with the first sound assumed a whining character, heard loudest at the apex. There was a double bellows murmur heard distinct from this, at the base. *July 11th.*—There was cough and expectoration. A fine moist rale could be heard over the lower half of left chest, both anteriorly and posteriorly. No dulness on percussion, or increased vocal resonance. *July 15th.*—He has now only one attack of angina in the day, which is also much less severe. The cough and expectoration are diminished. A mucous rale still perceptible in left lung inferiorly. A whining murmur with the first sound is still heard at the apex, and a double bellows murmur at the base, propagated in the course of the great vessels. He left the house at his own desire. The attacks of angina were at first treated with anodyne and antispasmodic draughts, containing M. v. of chloroform for a dose. Afterwards they were greatly relieved by taking carminatives, such as three drops of each of the oils of aniseed and cajeput dropped on sugar. Latterly they greatly diminished after ℥vj of blood were drawn from the cardiac region by cupping. The bronchitis was treated with anodynes and expectorants.

Commentary.—When this man entered the Infirmary it was very difficult to determine at what point the two bellows murmurs were heard loudest. Repeated and careful examination failed to discover whether one or both were referable to the apex or to the base ; and in consequence we could not, according to the rules given, determine whether the disease was aortic, mitral, or both. This was probably owing to the circumstance of the abnormal murmurs originating in two places, and being at the same time so similar in tone, that the diffusion of sound was pretty equal over the whole cardiac region. But as the case progressed the murmurs underwent such modifications as left us in no doubt. The murmur with the first sound over the apex assumed a whining tone, so that it was easily separated from the double bellows murmur which still remained loud at the base. The former, according to the rules given, must have depended on mitral incompetency ; whilst the latter, for the same reason, must have been owing both to incompetency and obstruction of the aortic orifice. The man laboured under slight pulmonary, as well as cerebral, symptoms. His chief complaint, however, was the angina, the attacks of which were in him very severe, causing the most excruciating agony, and bathing the whole surface with sweat. This, in its turn, seemed to be connected with a state of dyspepsia which existed. Whenever gas accumulated in the stomach, so as to distend that organ and press the heart upwards, the attacks were most severe. The carminatives gave relief by causing discharge of this gas. After local bleeding, and an improvement in his general health, but more especially in the dyspeptic symptoms, the angina diminished in intensity.

The two last cases recorded exhibit how important it is carefully to examine the cardiac signs from time to time as the case progresses, and to watch the modifications they undergo. Where doubt and difficulty prevail, it is only in this way they can be removed. Under such circumstances, never state an opinion at all, but continue to watch until the signs become permanent and unequivocal. This advice you will find to be even more useful in private than in hospital practice, for reasons which I shall allude to hereafter. But not only are frequent examinations useful in clearing up different points in diagnosis, but they reveal to the pathologist the changes which take place in the affected parts. Of this the following case affords us an instructive example.

CASE XCVI.*—*Incompetency of the Aortic Valves with Musical Murmur—Hypertrophy with Dilatation of Left Ventricle—Pneumonia—Pulmonary Hæmorrhage.*

HISTORY.—William Caird, æt. 29, labourer—admitted May 30. Five months ago he first noticed that he became unusually breathless, and had palpitations after exertion. He continued to work until two months ago, when, being engaged in lifting heavy stones, he was suddenly seized with pain in the cardiac region, violent cough, and hæmoptysis. He entered the Glasgow Infirmary, from which he was discharged, much relieved, in a fortnight. Since then he has been subject to giddiness, dyspnœa, and palpitation, with occasional hæmoptysis.

SYMPTOMS ON ADMISSION.—Cardiac dulness extends three and three quarter inches transversely. The apex beats between the sixth and seventh ribs, three inches below, and a little to the left of the nipple. A bellows murmur is heard with the second sound, loudest at the base, and propagated in the course of the large vessels. The first sound is normal. Pulse 92, strong and regular. He feels a shooting pain in the cardiac region, extending to the epigastrium. There is great dyspnœa, and palpitation on exertion. Slight cough, and fine moist rale in both lungs, heard inferiorly and posteriorly. Occasional giddiness.

PROGRESS OF THE CASE.—The pain in the cardiac region and epigastrium was the chief source of complaint during the progress of the case. The dyspnœa and palpitations were from time to time distressing. There was occasional vomiting. On the 12th of July, it was observed that the bellows murmur assumed a whining character, and on the 15th it was distinctly musical, like the chirping of a small bird. On the 17th, the heart's action was tumultuous, and vomiting was very distressing. On the 23d there was considerable hæmoptysis, mouthfuls of blood being evacuated. On the 24th, there was dulness on percussion over the inferior portion of chest, and distinct crepitation, with increased vocal resonance, could be heard. The cardiac dulness was determined, on careful percussion, to measure five inches transversely. The vomiting and hæmoptysis defied all remedies. The pulse was 100, soft. He gradually became weaker. The urine was scanty, and œdema of the legs appeared. Latterly there was muttering delirium at night. Died on the 29th. At first he experienced relief from the cardiac and epigastric pains, after small local bleedings by means of leeches and cupping. Blisters were also applied. All kinds of remedies were tried to check the vomiting, but with little effect. Antispasmodics were employed to relieve the dyspnœa; and latterly, as the pulse beçame weak, wine and stimulants were freely administered.

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* Reported by Mr. David Christison, Clinical Clerk.

Sectio Cadaveris.—Thirty hours after death.

Thorax.—Heart much enlarged, weighing 25 ounces, owing almost entirely to hypertrophy with dilatation of the left ventricle. When water was poured upon the aortic valves from above, it passed rapidly through the orifice. The aortic valves were thickened throughout and shortened; their curled-in and dense margins were one-tenth of an inch thick. Two of the valves were united at their neighbouring surfaces, so as to form one, the only vestige of a septum between them being a hardened nodule at the base of the enlarged valve. On the edge of the smaller valve was a warty excrescence, the size of a coffee-bean, soft in consistence, composed of recent exudation, and infiltrated with blood, so as to present a purple colour. There was red hepatisation of the posterior and inferior portion of both lungs, and there was considerable apoplectic extravasation in the substance and the neighbourhood of the diseased portions of the lung. The bronchi were filled with frothy mucus.

Abdomen.—The liver presented the nutmeg appearance, being in the first stage of cirrhosis. Other organs healthy.

Commentary.—We had very little difficulty in determining, from the cardiac signs in this case, that, according to the rules laid down, there was incompetency of the aortic valves, with dilated hypertrophy of the left ventricle. The bellows murmur, which was at first soft, gradually changed its character as the case progressed, without altering its position. It became whining, and then chirping, constituting what is called a musical murmur. It is generally found in such cases that a solid body projects into the current of the blood as it flows through the valve, so as to be thrown into vibrations; and it was interesting to discover, on the examination of the body, that the vegetation described exactly fulfilled these conditions. From its softness also there is every reason to suppose it was of recent formation, originating probably about the time the musical murmur was first observed. From the great induration of the aortic valves, there can be very little doubt that they had been affected for a long time, at least many months; but it becomes a question, whether the adhesion and formation of one valve out of two might not have been caused by a rupture of one or both valves, two months previously, at the time he was lifting heavy stones, and was suddenly seized with cardiac pain and other symptoms. It is worthy of observation, also, that, although he had cerebral symptoms, the lungs were greatly affected, the bronchitis latterly passing into pneumonia with pulmonary hemorrhage.

Case XCVII.*—*Mitral Incompetency—Hypertrophy of Left Ventricle—Dilatation and Disease of Arch of Aorta—Aortic Incompetency.*

History.—Hugh Devine, æt. 40, labourer—admitted July 17. Dates his illness from a severe strain of the back, eighteen months ago, but is not sure when he first noticed dyspnœa and palpitation, which have prevented him from working for the last eight months. Never had rheumatism or hæmoptysis.

Symptoms on Admission.—Cardiac dulness measures two and three quarter inches transversely. The apex beats between the fifth and sixth ribs, two inches below, and a little to the right of the nipple. A bellows murmur with the first sound is heard at the apex, decreasing towards the base. A bellows murmur of a rougher character is also heard with the first sound at the base, which is prolonged in the course of the large vessels. The second sound is normal. There is distinct pulsation under the clavicles, but none above the sternum. Pulse 104, regular, full, and jerking. No cough or pulmonary symptoms, with the exception of dyspnœa on exertion. Has frequent pain in the upper part of the head and across the temples, and occasional dimness of vision. The thyroid gland is somewhat enlarged.

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* Reported by Mr. David Christison, Clinical Clerk.

Progress of the Case.—Since his residence in the Infirmary the symptoms have been greatly ameliorated. The dyspnœa, palpitation, and cephalalgia, have nearly disappeared. The cardiac signs, however, have undergone considerable change. On the 16th of August it is reported that there is still a bellows murmur with the first sound, heard loud at the apex. An inch above, and to the inside of the nipple, a loud, harsh, grating murmur is heard with the first sound, and followed by a soft bellows murmur with the second. In the course of the aorta there is unusual impulse, and coinciding with it there is a bellows murmur, which is propagated along the carotids. He was dismissed, September 12th.

Commentary.—This man was examined with great care, and cardiac signs ascertained to exist which are not often associated together. For instance, there was a distinct bellows murmur, loud over the apex and diminishing towards the base, which, according to the rules given we ascribed to mitral incompetency. Over the aortic valves, however, and extending along the arch of the aorta, there was a bellows murmur of a rougher character, and also occurring with the first sound. Now Rule 7 tells us that this may depend on three circumstances,—"1st, On an altered condition of the blood, as in anæmia; 2d, On dilatation or disease of the aorta itself; and, 3d, On stricture of the aortic orifice, in which case it is almost always associated with insufficiency, and then the murmur is double." It is clear that the first and third propositions would not apply, and I therefore came to the conclusion that in addition to mitral regurgitation, the aorta was dilated and diseased, the former indicated by the increased impulse, and the latter by the roughened murmur. Latterly, when dismissed, the roughened murmur over the aorta assumed a rasping character, and a soft bellows murmur was also heard with the second sound,—so that the dilated and diseased aorta had at that time probably become associated with aortic incompetency.

Case XCVIII.*—*Constriction of Mitral and Tricuspid Orifices—Aortic Incompetence—Anasarca—Hydrothorax—Collapse of Left Lung—Bright's disease of Kidney.*

History.—Elizabeth King, aged 26—admitted July 20th, 1855. Two years ago she entered this Hospital, labouring under an attack of acute rheumatism; was dismissed relieved at the end of six weeks, but soon afterwards she was again laid off work by general anasarca; and in the November of the same year (1853) she

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[*] Reported by Mr. D. M'Gregor, Clinical Clerk.

again returned to this Infirmary. She was a patient in the Clinical Wards; was treated for double pneumonia; was recognized at that time as labouring under mitral insufficiency; was much relieved during her stay, and discharged in the middle of February 1854. But she has never recovered her strength. Three months ago she became affected with swelling of the legs and abdomen, with occasional slight lumbar pain, and with severe pain in the hypogastric region attendant upon the abdominal swelling. The pain and the swelling have gradually become worse. She has been confined to bed for the last ten days.

Symptoms on Admission.—Impulse weak; apex beat not definable; transverse dulness three and a half inches; at the normal site of apex beat there is a double blowing murmur; the same is audible all the way up to the clavicle, but it diminishes in intensity from below upwards. Pulse 86, small and weak; palpitation, vertigo, slight cough; muco-purulent expectoration; dyspnœa on exertion, with occasionally orthopnœa at night; face slightly livid, with a faint tinge of yellow; is naturally freckled. Has great thirst and little appetite; the bowels are costive. The urine is scanty, of an orange-yellow colour; sp. gr. 1015; is not albuminous. The lower extremities and the skin over the hypogastric region are œdematous; tense and painful on pressure. Yesterday had severe pain in the right iliac passing to the lumbar region. Does not sleep well at night.

Progress of the Case.—The pain in the right iliac region disappeared under treatment during the first week. Vomiting occurred at every meal during the same period. After the 24th July, the urine contained a large quantity of bile, and the whole body became slightly jaundiced. No increase in urine could be effected. On the 9th August it is reported very scanty and albuminous. The anasarca steadily increased, with painful tension of limbs and abdomen. Ultimately the whole trunk, upper extremities, and face became œdematous. Respiration became more embarrassed, and over the upper parts puerile. On the 8th August there were signs of hydrothorax on the left side. The dyspnœa, cough, sleeplessness, and want of nourishment wore out her remaining strength; and she died Sept. 5th. At first, leeches, followed by warm fomentations, were applied to the hypogastric and right iliac regions to relieve the local pain. Subsequently, diuretics and cathartics were employed to relieve the anasarca, combined with nutrients and latterly stimulants.

Sectio Cadaveris.—Eighteen hours after death.

Body extremely anasarcous.

Thorax.—Heart weighed 10½ ounces, lay unusually transverse, with apex pointing to left side. The right auricle was dilated, especially the auricula; the foramen ovale within the annulus was not patent, but the membrane was pushed back into a pouch; its lining membrane was much thickened. The tricuspid valves were thickened at their margin, and so constricted that the first joint of the little finger up to the root of the nail could alone pass. The pulmonary valves were quite healthy. The left auricle was not dilated; the mitral valves were thickened and constricted so as only to admit the first joint of the little finger up to about the middle of the nail; the tendinous cords were so shortened that the valves appeared to be fixed directly to the summit of the columnæ carneæ. The aortic valves were also thickened (more at the margin than the base) so as to be inelastic and incompetent. Both ventricles hypertrophied and dilated. The left lung was collapsed; about 1½ pints of fluid in the pleural cavity. The right lung was adherent throughout, especially at the base, to the diaphragm; the diaphragm itself was adherent to the costal pleura from the sixth rib downwards. On section, the lung appeared very œdematous in some portions, and in others collapsed.

Abdomen.—The liver was fatty; weighed 2 lb. 10½ oz. The spleen seemed healthy. The kidneys were atrophied, especially the right, which weighed 2½ ounces; and on section presented a good specimen of the hard, contracted, and granulated kidney of Bright. In the left kidney only one cone was disorganized. The uterus and ovaries were normal, and the intestines healthy.

CASE XCIX.*—*Constriction of Mitral and Tricuspid Orifices—Œdema—Hemorrhage into the Lungs.*

HISTORY.—William Page, æt. 20, ploughman—admitted August 30th, 1852. States that nine months ago, while carrying a heavy sack of grain on his back up a flight of stairs, his foot slipped, and he fell with the load upon him. Asserts that he was insensible for a fortnight afterwards, and on recovering was affected with cough and bloody expectoration for a month. He has also been constantly liable to palpitation, dyspnœa, and starting from sleep, and been unable to ascend stairs in consequence of the violent palpitations and feeling of faintness thereby produced. Says he was in perfect health at the moment of the accident, and never had rheumatism. Has been subjected to various kinds of treatment, and been salivated with mercury without any benefit.

SYMPTOMS ON ADMISSION.—Apex of the heart beats distinctly in the intercostal space between the sixth and seventh ribs. The impulse is strongest in a line drawn vertically from the nipple—is full, and rather diffused. The pulsations at the heart are more numerous than those at the wrist. On percussion the cardiac dulness measures three and a half inches across. On auscultation a prolonged blowing murmur is audible with the first sound at the apex, which decreases in intensity towards the base of the organ, and is entirely lost at the commencement of the great vessels. Second sound normal. Pulse 72, full, not hard; and there is an occasional small, sharp beat occurring after every five or six of the ordinary pulsations. Breathing slightly accelerated, amounting to dyspnœa on the slightest exertion; occasional cough, followed by tough mucous expectoration, interspersed with a few points of a dirty rusty colour. Percussion and auscultation over lungs only elicit a few scattered, sibilant, and sonorous rales, posteriorly on left side. The appetite has been diminished, with occasional vomiting for the last three months. Is apt to start hurriedly from sleep after lying down, and is disturbed by dreams. Slight œdema of the feet and ankles. Urine healthy. Other functions normal.

PROGRESS OF THE CASE.—During the months of September and October the symptoms gradually increased. The dyspnœa became more urgent, and the paroxysms more frequent. The cough with bloody expectoration, the œdema, general weakness, and palpitations were all augmented. There has also been occasional vomiting, and the skin has assumed a yellow jaundiced hue. He had again been put under a mercurial course, and a variety of remedies were employed to relieve cough and spasm, all of which produced only temporary relief. On taking charge of the case on the 1st of November, I found a loud blowing murmur occupying the period of both sounds at the apex, the impulse of which was felt between the fifth and sixth ribs, two inches in a straight line below the nipple. Over the zyphoid cartilage the second sound was determined to be healthy, immediately following the blowing with the first. At the base also the second sound was heard distinctly normal, and the blowing with first sound, though still loud, more distant. Sputum was gelatinous, deeply tinged with fluid blood. Anteriorly the chest was resonant, but inferiorly and posteriorly percussion was slightly impaired, with occasional crepitating rale and double friction. Pulse 120, feeble, and irregular; great weakness. *Nutrients with wine. November 12th.*—Is worse. Great lividity of face and orthopnœa. Heart's action so tumultuous that no individual sounds can be distinguished. Extremities œdematous and cold. Pulse imperceptible. In this condition he continued until the 15th, when he died.

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* Reported by Mr. William Calder, and Mr. David Milroy, Clinical Clerks.

Sectio Cadaveris.—Forty-four hours after death.

Body not emaciated; surface considerably jaundiced.

THORAX. — Pericardium contained several ounces of serum. Heart much enlarged especially on right side. Right auricle the size of a large orange. Left auricle also considerably distended. Both ventricles dilated, the walls not much hypertrophied. Endocardium of left auricle thickened and opaque. Mitral valve constricted, its edges rigid, and partly calcareous, so that it would only admit one finger. The tricuspid valve was also constricted, so as scarcely to admit two fingers. This was owing to thickening and shortening of the valvular segments, which were also abnormally adherent to each other at their extremities. At the edge of one valve, were a few rough granulations of lymph. Aortic and pulmonary valves healthy. Both lungs were emphysematous anteriorly, but the dilatation of individual air-cells was not extreme. In the posterior and inferior portions were irregular condensed masses of hemorrhagic extravasation, varying in size from a walnut to a hen's egg. Interspersed through the lungs generally were several miliary tubercles. The pleuræ were adherent in several places, and also contained a few tubercles. The trachea and bronchi were loaded with viscid muco-purulent matter.

ABDOMEN.—Liver congested, presenting to a certain extent the nutmeg appearance. Kidneys and other abdominal organs healthy.

Commentary.—In both these cases careful examination of the heart did not enable me to form a conjecture that the tricuspid valve was diseased. In the first case the continuous blowing at the apex completely masked the second sound, even at the base of the organ. In the other case, while the blowing occupied the period of both sounds at the apex, the second sound was audible towards the right, over the xyphoid cartilage. In the case of King, there was also incompetency of the aortic valves, but in both the auriculo-ventricular valves were the chief seat of disease. The symptoms were not unlike, and were characterised by excessive palpitation; great dyspnœa, with œdema of the lungs in one, and hemorrhage into the lungs in the other case; vomiting, dropsy, and jaundice. None of which symptoms, however, either individually or collectively, can be said to indicate tricuspid as distinguished from mitral lesion. The origin of the two cases was widely different. The one dependent apparently on rheumatic endocarditis, the other caused by a fall and contusion, although how this should have affected both auriculo-ventricular valves is by no means clear. The utility of mercury was fairly tested in Page's case, and as usual found to be of no benefit whatever. Theoretically it is impossible to understand how this drug is to diminish thickenings of valves or contractions of the chordæ tendiniæ, and practical experience has utterly failed in demonstrating its advantage in endocarditis any more than in pericarditis.

CASE C.*—*Soft Adherent Polypus, causing incompetency of the Mitral Orifice—Anasarca.*

HISTORY.—William Taylor, æt. 50, a compositor—admitted Dec. 20th, 1852. The patient enjoyed good health till a year ago, when he became subject to attacks of vertigo. The first of these came on after a long race; they recurred frequently, especially after meals. Three months ago, cough and dyspnœa came on, which have gradually become worse. Two weeks ago, his legs began to swell, and five days ago the lower part of both legs became of a purple colour, not disappearing on pressure, the rest of the skin of the body assuming a yellowish hue; these discolorations have since increased. Has suffered much mental distress during the last six months.

SYMPTOMS ON ADMISSION.—Cardiac apex in normal position; impulse somewhat increased. With the first sound there is a blowing murmur heard loudest at the apex; second sound normal; transverse dulness normal. Pulse very small and weak, 120 per minute. Percussion of the lungs normal; breathing hurried, respirations being 40 per minute; no abnormal sounds audible on auscultation. Sleeps badly and is very weak. Tongue slightly furred; appetite bad; bowels constipated; stools dark coloured. Urine in good quantity, high coloured, loaded with lithates; contains a slight amount of albumen. Legs swollen. Ordered to have ℥iv *of wine and a diuretic mixture.*

PROGRESS OF THE CASE.—*December 23d.*—Crepitation over lower half of both lungs posteriorly; no dulness or increased vocal resonance. Expectoration streaked with blood. Weakness great; pulse hardly perceptible. Ordered *expectorants and* ℥vj *of wine.* *24th.*—Urine passed in very small quantity. Ordered diuretics with nitric æther and half the wine to be replaced by an equal quantity of gin. *25th.*—Was delirious last night, and suffered from dyspnœa. Died this morning at half-past eleven.

Sectio Cadaveris.—Forty-eight hours after death.

THORAX.—The pericardium contained about an ounce of turbid yellowish serum. The heart was slightly enlarged on the right side. All the cavities were full of blood, partially coagulated, the coagula being soft and coloured throughout. In the left auricle was a soft, gelatinous, semitransparent mass the size of a pigeon's egg, which hung over the mitral orifice, and appeared to choke it up. It was firmly attached to the membrane of the auricle by a surface about half an inch square, in substance resembling colloid, and externally was not unlike a soft polypus, or a mass of uterine hydatids; on section, it was homogeneous, and consisted of a fibrous stroma, which could easily be torn, enclosing between its meshes a clear viscous fluid. The flaps of the mitral valve were somewhat thickened, without deformity or thickening of the chordæ tendiniæ, which with the columnæ carniæ, were quite healthy. The other valves were normal. The lungs were œdematous, with small hemorrhagic patches at various points.

ABDOMEN.—The peritoneal cavity contained about half a gallon of clear serum. There was slight hepatic congestion of the liver, but the other abdominal viscera were unfortunately not examined by the pathologist.

MICROSCOPIC EXAMINATION.—The attached polypus in the left auricle consisted of bands of fibrous tissue, crossing one another and forming oval and circular areolæ containing a viscous serum. Embedded in these bands were nucleated cells, round, oval, and fusiform in shape. Some of the latter were lengthened out into fibres. They were fibre cells exhibiting every stage of transformation, from the rounded cell up to that of perfect areolar tissue.

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* Reported by Mr. R. Brown, Clinical Clerk.

Commentary.—The structure and firm attachment of the polypus in this case, can leave us in no doubt that it must have existed some time before death, and caused the symptoms of which this man complained. From its position it appeared calculated materially to interfere with the passage of the blood from the left auricle to the left ventricle, but the sound, during life, indicated an incompetency rather than a narrowing or stricture of the auriculo-ventricular orifice. To it, however, the excessive dyspnœa, which was the chief character of the case during life, was most probably owing. The mass itself closely resembled, to the eye as well as under the microscope, some kinds of simple colloid I have seen; whether it originated in an exudation, in a deposition of fibrin from the blood, or in a combination of the two, it is difficult to determine; the last supposition is the most probable.

That coagula are formed from the blood in the cavities of the heart during life, there can be little doubt, although we are ignorant of any means of detecting them. They have been supposed to be the result of endocarditis. If so, we must suppose that an exudation thrown out on the endocardial lining membrane causes roughness, which, as the blood flows over it, tends to produce fibrinous deposition from that fluid. However formed, two subsequent changes may occur—1st. Fibre cells may be formed in it, and the whole gradually developed into a fibrous structure as in Case C. This is very rare. More commonly it softens in the centre, and is gradually reduced to a fluid, which to the naked eye closely resembles pus. Such collections have been called "purulent cysts." I have frequently examined the contents of these cysts, and have no doubt that in many cases, the so-called "purulent cysts" are simply formed by a mechanical disintegration of the clot, in the manner first described by Mr. Gulliver, and are not purulent cysts at all. I once found a pyriform clot in the right ventricle of the heart, firmly attached to the endocardium by its smaller extremity. It was the size of a hen's egg, and on cutting into it there flowed out two ounces of a fluid exactly like good laudable pus. Yet it did not contain one pus corpuscle, but was wholly made up of molecular matter, associated with the broken down debris of a fibrous clot, and a few collapsed colourless cells of the blood. In this way a microscope demonstrates, not unfrequently, that what was regarded as pus, and considered a proof of inflammation, is in truth quite unconnected with the latter process, and is owing to altogether different causes.

CASE CI.*—*Enlarged Foramen Ovale—Phthisis.*

HISTORY.—James M'Queenie, æt. 27, a tailor—admitted June 23d, 1853. Has never been a strong man, having been very liable to suffer from colds and indigestion. Since boyhood he has been liable to palpitation and dyspnœa on the slightest exertion. His health, however, continued pretty good till eighteen months ago, when he was admitted into the Infirmary under another physician. He then laboured under inflammatory fever, with cough and pains in the chest; there was evidence of condensation of the apex of the right lung; and obscure shifting murmurs were heard with the cardiac sounds, which led to the belief that the patient was suffering from subacute pericarditis in the course of tubercular disease. He was treated with aconite, and afterwards with mercury. He became much better, but did not entirely regain his health; the physical phenomena remained as before; cough and expectoration also continued. Of late these symptoms have become more troublesome, so as to induce him to re-enter the Hospital.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Symptoms on Admission.—Apex of the heart beats slightly to the right of the usual position; transverse dulness three inches; sounds feeble and indistinct; with the first and running into the second, there is a peculiar whizzing, neither a blowing nor a friction murmur; it is heard most distinctly at the base, is not constantly present, and is not propagated along the large vessels. Heart's impulse feeble, and producing a *wavy* motion under three intercostal spaces. Palpitation on exertion or mental excitement. Pulse 90, small and slightly intermittent. Under the right clavicle, dulness on percussion, with increased sense of resistance, and imperfect cracked-pot sound; on auscultation there are loud moist rales almost gurgling in character; much prolonged expiration; loud bronchophony. Towards the lower margin of the right lung there is harsh respiration with sibilus. Below the left clavicle for a handsbreadth there are fine moist rales with prolonged expiration and loud vocal resonance; sibilus also, as on the right side. Posteriorly the signs correspond to those in front. Sputum abundant and mucopurulent; cough frequent, but not harsh; breathing easy. Appetite scarcely impaired. Occasional diarrhœa, now checked by astringents. Hepatic and splenic dulness normal. Great sweating at night. Urine of normal character. *Ordered to take cod-liver oil, and to have nourishing diet.*

Progress of the Case.—*June 23d to July 13th.*—Treatment as above; strength much increased. Yesterday had a rigor, followed by stitch in the side; it was relieved after the application of leeches. *July 13th-23d.*—Has gradually become much worse. Suffers now from great dyspnœa, frequent cough, copious expectoration, night sweats, loss of appetite, diarrhœa, and great weakness. No great change in the physical signs; the heart sounds are much masked by the pulmonary rales. Has taken cod-liver oil, with occasional antispasmodics and astringents, and latterly ℥iv of wine and ℥ij of brandy in the course of the day. *July 24th.*—Gradually sunk, and died at twelve noon.

Sectio Cadaveris.—Twenty-five hours after death.

Body much emaciated; rigor mortis moderate.

Thorax.—No adhesions between the layers of the pericardium, or between the pleura and that membrane. The pericardium contains about two ounces of turbid yellowish fluid with small flocculi of lymph. Surface of the heart presents a milky patch the size of a shilling towards its base posteriorly, and there are some smaller ones over left auricle. Heart soft, flaccid, and fatty; it weighs twelve ounces. The right ventricle is much dilated and the walls are thin; the tricuspid orifice admits four fingers with ease; mitral valves very slightly thickened at the margins, but otherwise healthy; aortic valves healthy. In the *septum auricularum* there is a large opening which can admit three fingers; evidently the *foramen ovale* much enlarged; it is oval in shape, and the edges are smooth and rounded. Pulmonary artery dilated; calibre of the aorta diminished, and only half the size of the pulmonary artery. Right lung adherent all over. Adhesions firmest near the apex. The lung is non-crepitant throughout, and everywhere infiltrated with tubercle, which is most chronic at the apex, where there are several puckerings and dense cicatrizations. The left lung also infiltrated with tubercle, but not to so great an extent, and more recent.

Abdomen.—The liver was much congested, with a linear cicatrix two inches long, situated half an inch anterior to its diaphragmatic attachment. The lower third of the ileum, with the cœcum and ascending colon, the seat of numerous tubercular ulcerations. A few tubercular deposits in the mesenteric glands. Other organs normal.

Commentary.—The peculiarity of the cardiac sounds in this case, consisted in the existence of a kind of whizzing murmur, synchronous with the systole, and loudest at the base, combined with palpitations, feeble impulse, and a weak intermittent pulse. This combination of signs and symptoms forbade the supposition that the lesion was aortic, while the sex, and absence of murmur in the larger vessels, were opposed to the notion of its being anæmic. After death a large opening was found between the auricles, with smooth edges, which must have admitted the ready flow of blood through it. Whether the peculiar whizzing sound was caused by this opening, it is difficult to say, but judging from its situation and character, this seems very probable. The slight thickening of the flaps of the mitral valve did not seem to interfere with its competency, and certainly caused no murmur.

Few well-observed cases of patent foramen ovale in the living subject have been recorded. In one recorded by Dr. Markham,* the open foramen ovale allowed the blood to pass readily from the right to the left auricle, but not in the opposite direction, excepting through two narrow slits. There was audible during life a loud, rough, and prolonged systolic murmur over the whole pericardial region, over the upper part and along the right border of the sternum, and in the whole of the upper half of the interscapular space. From an inquiry by Dr. W. Ogle † into this subject, when he was Curator of the Pathological Museum at St. George's Hospital, he found that of thirteen cases of patent foramen ovale, it was stated in seven that no murmur synchronous with the systole existed. The size of the openings is not given. In one other case, a diastolic murmur was present, owing to undoubted disease of the aortic valves. Hence, of the whole thirteen, there was no evidence that this lesion produced a murmur at all. Dr. Markham's case being uncomplicated and well observed, affords pretty strong evidence that a murmur may, under certain conditions, be occasioned by open foramen ovale, as does the one now recorded. But what those conditions are, as well as a crowd of interesting points in connection with them, can only be determined by future observations.

Pathology of Valvular and Organic Diseases of the Heart.

The lesions producing valvular diseases of the heart are various, and may be referred to mechanical violence, to the effects of exudation, acute or chronic, to depositions of fibrin, and to the different forms of degeneration of texture. But, however occasioned, they all tend to produce subsequent changes in the texture and vital actions of the heart itself, above all, hypertrophy and fatty degeneration of its muscular walls, with increased, diminished, or irregular contractions of its cavities. Although it is with these latter that the physician has principally to do, a knowledge of the former is essential to the correct appreciation and proper treatment of every individual case.

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* British Medical Journal, April 4th, 1857.

† Ibid. June 13th, 1857.

Mechanical injuries not unfrequently occasion sudden disease or rupture of the valves (Cases XCVI. and XCIX.), separating their attachments, and causing subsequent adhesions and fibrinous depositions. Great muscular exertion has also occasioned similar results. Four cases of this are recorded by Dr. R. Quain,* in one of which a smith, when working vigorously, experienced "an uneasy shaking of the heart," shortness of breath, and heard a peculiar noise "up his chest, neck, and in his ears." On examination, a loud ringing musical murmur was heard over the aortic valves with the second sound, and there was a softer blowing with the first sound. After suffering two years, during which the sounds underwent different modifications, followed by cardiac hypertrophy, he died, and on dissection, the conjoined attachments of two of the valves to the aorta were found to be separated from the wall of that vessel, so that they dropped below the level of the third, which retained its connections. (Fig. 387.) Cases of this kind would perhaps be more frequently observed, if the origin of valvular diseases were more carefully looked for.

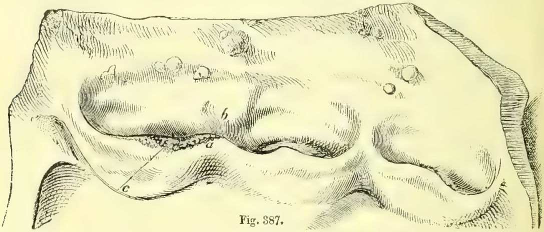

Fig. 387.

Fig. 387. Conjoined attachment of two of the aortic valves at *a*, separated from the aorta at *b*. Here the wall of the vessel was raised into a superficial elevation. At *c*, the margin of one valve was slightly everted, and studded with small granulations.—(*R. Quain.*)

Exudation into or on the surface of the valves, constituting the endocarditis of systematic writers, is a common cause of valvular disease. If acute, it may appear in the form of minute granulations, or forming a layer, varying in thickness and shape, on the surfaces or on the edges of the valves. If chronic, they are firm, and not unfrequently associated with an exudation which has also occurred in the texture of the valve itself, causing more or less thickening or induration of its various parts. In the same manner the chordæ tendiniæ may become thickened and shortened from interstitial exudation. As a result, the edges of the valves do not come into accurate contact, and become incompetent to fulfil their functions. After a time, in consequence of excess of exudation and subsequent contraction, the orifices are narrowed, and mechanical obstructions offered to the free passage of the blood through them.

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* Monthly Journal of Medical Science. December 1846.

In the aortic valves in addition to thickenings and contractions, adhesions may occur, with or without the lacerations of septæ formerly noticed. In this manner there may be two, rarely only one valve, from laceration of the attachment to the aorta and subsequent adhesion of the broken edges. In Fig. 388 the union of all the valves has resulted in the formation of one valve of a funnel-shape. In Fig. 387, two valves have, as it appears, been broken into one another and united together, so as to form one. In Fig. 390, one of the valves seems to have been abortive, or not developed. Again, the number of valves may be multiplied in consequence of adhesions being formed, and

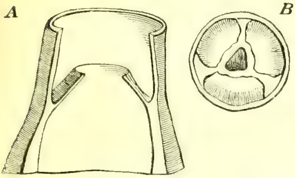

Fig. 388.

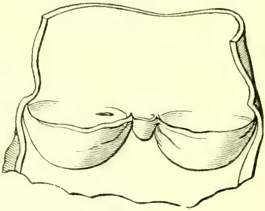

Fig. 389.

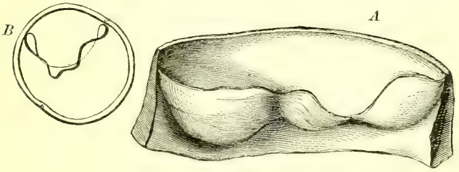

Fig. 390.

Fig. 388. *A*, Aortic orifice with one valve of a funnel-shape, seen from the front. *B*, The same valve seen from above, showing the original septæ of the valve united together.—(*Peacock.*)

Fig. 389. Two valves at the aortic orifice, with a rudimentary one interposed.—(*Risdon Bennett.*)

Fig. 390. Congenital malformation of the aortic valves. *A*, The aorta slit up lengthways. *B*, Transverse section of the aorta just above the valves.—(*Brinton.*)

extra pouches thereby established. Thus four valves are occasionally met with, as in Fig. 392. Sometimes these are of unequal size, and are then most commonly the result of disease. But I have seen four valves, all exactly like one another, in which case the malformation appears to be congenital.

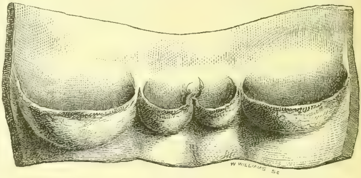

Fig. 391.

The mitral valves, in addition to roughnesses and thickenings of the valves themselves, and various alterations of their edges in consequence of shortening of the chordæ tendiniæ, present in chronic cases a great tendency to contraction of the orifice. On looking down into the auricle, these constrictions of the auriculo-ventricular orifice are seen to assume two shapes, the one being only, however, a greater degree of contraction than the other. In the first it exhibits a slit, or button-hole appearance, in the other a rounded or oval aperture—both openings being at the base of a funnel-shaped depression, caused

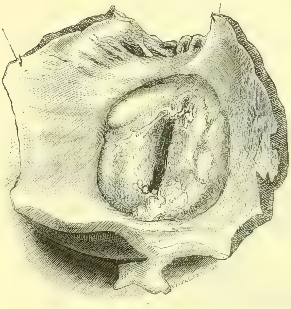

Fig. 392.

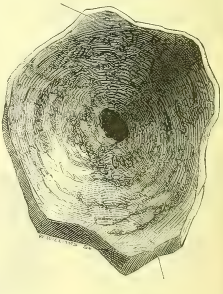

Fig. 393.

Fig. 391. Four valves at the aortic orifice, from adhesion of one to the wall of the vessel, so as to form two pouches.

Fig. 392. Mitral orifice, constricted so as to form an elongated and rigid slit resembling a button hole. Seen from the auricle.

Fig. 393. Mitral orifice, greatly constricted, so as to form an oval aperture, at the bottom of a funnel-shaped depression. Seen from the auricle.

by the adhesion, thickening, and contraction of the edges of the two valves.

Deposition of fibrin from the blood may occur on the valves in consequence of laceration, or of exudations; but sometimes, so far as can be ascertained, without organic lesion. It has been experimentally proved, that the introduction of a thread across the aortic aperture, will cause the precipitation upon it of the fibrin of the blood—(*Simon*). Any rough surface will produce the same effect. Indeed there is every reason to suppose, that when the blood abounds in fibrin, as especially occurs in acute rheumatism, such deposits may take place on the valves themselves, without any previous lesion of them, an occurrence which would serve to explain the relation between rheumatic and cardiac disorders. Be this as it may, there can be little doubt that such rheumatic disposition once established, fibrinous deposits are thrown down, which constitute the vegetations so frequently found at the edges of the valves, resembling soft warty tumours, obstructing the orifices, and occasionally hanging down by peduncles into the ventricle. Fig. 394.

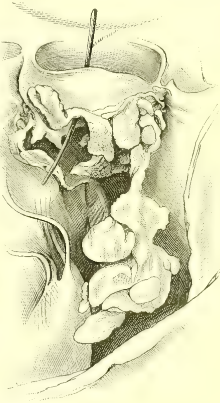
Fig. 394.

Degeneration of the valves may occur in various ways, and in its nature be albuminous, fatty, or mineral. Thus the thickening and indurations owing to chronic exudation, may assume a density equal to ligament or fibrocartilage. Or, on the other hand, they may soften, undergo the fatty degeneration, and at length ulcerate, forming one or more perforations through the membranous portion of the valve. (Fig. 394.) Lastly, it is by no means uncommon to find the thickened valves to have undergone the mineral degeneration, presenting nodules and masses of earthy matter, varying in size, more or less rough, resembling concretions, and obstructing the orifice in proportion to their size.

The immediate result of all these different lesions is, that the valves being incompetent, and not closing perfectly, the blood regurgitates back into the ventricles or auricles at each systole or diastole, according to the valve affected; or if there be contraction and obstruction at the orifice, it is propelled forwards with difficulty. In either case, increased muscular effort is required to carry on the circulation, and the result is the greater or less enlargement or hypertrophy.

Fig. 394. Fibrinous vegetations, and atheromatous degeneration of the aortic valves.

Hypertrophy of the heart may arise from several causes; but by far the most common is disease in one or more of its valves. In this case, it follows the law of increased growth formerly referred to (p. 155), whereby parts subjected to unusual exertion or increase of function augment in bulk. Hence either disease of the aortic or mitral valves induces hypertrophy, with dilatation of the left ventricle, from the necessity of increased action. The same causes operate on the other parts of the organ. Chronic bronchitis and emphysema, by impeding the circulation in the lungs, produce similar enlargements in the right ventricle, and so on. In chronic heart diseases, it is rare that the lesion is confined to one cavity, because, as it advances, it produces increasing embarrassment in the others. Thus hypertrophy of the left ventricle, in consequence of aortic disease, after a time induces enlargement of the left auricle; this embarrasses the return of blood from the lungs, causing congestions and derangement of those organs. These in turn induce enlargement of the right cavities of the heart, and then the return of blood from the systemic circulation is impeded, causing congestions in the liver and other viscera. In consequence of the over-distension of the venous capillaries so occasioned, effusion of serum occurs, producing œdema, and more or less anasarca. As the dropsical fluid so occasioned augments, the pressure it produces interferes still more with the action of the kidneys, skin, lungs, etc., until at length life can no longer be maintained. These effects will follow more rapidly if, in addition to the aortic, the mitral valves are disordered, or if further complications add to the gravity of the case. Thus the tricuspid orifice may also be affected (Cases XCVIII. and XCIX.); or there may be adherent pericardium, or aneurism of the large vessels. Again, the course of these changes may be modified or inverted. The disease, for instance, may commence in the lungs or liver, and by the obstructions to the circulation thereby occasioned, may affect the heart secondarily. Or, conjoined with valvular disease and hypertrophy, there may be primary lesions of the lungs, kidney, or liver. It is by pathological knowledge alone that the influence and mutual dependence of these various derangements can be understood, and a treatment judiciously directed to their relief.

Fatty Degeneration of the Heart.—The heart may be loaded and even more or less infiltrated with adipose tissue, producing one form of fatty degeneration. By far the more important form, however, is the lesion, for a knowledge of which we are indebted to the recent researches of histologists, and more especially in this country of Paget, Ormerod, and Quain. Of its nature I have already spoken (p. 226). It may occur as a sequela of every form of cardiac disease, but especially when the aortic valves are affected, as well as from a modification in the general condition of the system leading to fatty degeneration of a number of other organs. It may be observed, for instance, that in cases where the liver and kidneys are fatty, that the muscular substance of the heart is commonly fatty also. Indeed there is no degeneration of texture more common than that of fatty heart, which, existing in various degrees, is dangerous in proportion to its intensity, extent, and complication with other diseases. In elderly persons more especially this degeneration may proceed to a great extent without even being suspected, and then some unaccustomed exertion, by demanding from the organ more forcible muscular contractions than it is capable of exerting, suddenly arrests its action, and fatal syncope is the result. Many cases of sudden death formerly ascribed to "apoplexy," or "spasm of the heart," may now be confidently affirmed to have been owing to this lesion. Its detection in the living body, cannot be made with confidence. Slowness and feebleness of the pulse have been by some thought diagnostic. But many extreme cases of this degeneration have died under my observation without any such symptom. It may cause rupture of the heart and fatal hemorrhage.

Myocarditis, or true inflammation of the substance of the heart, is one of the rarest organic diseases known. Whether, in cases of pericarditis, the muscular substance below the serous membrane is the seat of an exudation, is yet to be determined by histological research. The introduction of the term "Parenchymatous inflammation," employed by Virchow, can only cause confusion, without in any way advancing our knowledge, as, in truth, it is no inflammation at all, but the fatty degeneration of the muscular fasciculi just referred to.

Treatment of Valvular and Organic Diseases of the Heart.

That the various lesions of the valves are susceptible of being removed by drugs, is one of those notions which the advance of diagnosis and pathology has happily expelled, and which seems now almost universally admitted. All that the practitioner can hope to accomplish, is to modify, and, if possible, check those resulting phenomena from which real danger is to be apprehended. But here much misconception has prevailed as to the real object to be kept in view, or rather the phenomena themselves have been wrongly interpreted by medical men. We have seen that valvular disease leads to dilated hypertrophy; this is accompanied by excessive action, and, especially if the aortic valves are diseased, by a strong, jerking, and hard pulse. The notion is very general, that simply because the pulse is strong, it is the mission of the practitioner to make it weak; that because the heart acts violently, it ought to be made to beat quietly by lowering remedies. But the strong pulse and enlarged ventricle in the one case, is a wise provision of nature, set up to counterbalance the otherwise fatal consequences of the valvular obstruction; and the violent action of the heart in the other, is a proof of weakness rather than of strength, and instead of being lessened by bleeding and antiphlogistics, requires for its removal tonics, nutrients, and calmatives. To no one is medicine more indebted for making this proposition intelligible than to Dr. Corrigan,* and his views and practice have been acted upon to a great extent by those who have sedulously cultivated the physical diagnosis of diseases of the heart. It is the attempt to treat mere symptoms without a knowledge of the organic diseases on which they depend that leads to mistakes among medical men. But *with* that knowledge, their judicious treatment of the effects of valvular disease of the heart, forms one of the best examples of a modern scientific as distinguished from a former empirical practice.

What then we have principally to attend to in valvular diseases of the heart is, to do all in our power to support the normal strength of the economy, and avoid agitating the patient, instead of lowering the pulse, or giving mercury under the idea that thereby we are putting down an inflammation or causing absorption of the exudation. In this way persons affected with cardiac disease have continued to live quite unconscious of it for many years in comfort. If, however, it occasion dyspnœa, care must be taken to avoid sudden exertion, mounting stairs, and violent emotions; while by means of diet properly regulated, and gentle exercise, a due supply of blood is maintained, and its unequal distribution between the lungs and liver prevented. Pain, angina, and paroxysmal attacks may be relieved by the cautious use of morphia, digitalis, aconite, and other sedatives, used as palliatives, and occasionally by carminatives. (Case XCV.) When dropsy appears, we may delay its advance, and often get rid of it for a time, by means of diuretics, sudorifics, and even, if the strength admit of it, by drastic purgatives. According to Stokes, the action of these remedies may occasionally be assisted by mercurials. For any other purpose they are useless. When hypertrophy exists to any great extent, and there is obvious difficulty in propelling the blood through the lungs, as distinguished by excessive dyspnœa, lividity of the face, and irregular heart's action, the application of a few leeches, or cupping to the extent of four or five ounces of blood, frequently gives great relief for a time. Even dry cupping is often beneficial. If there be a tendency to faintness, or reason to suspect fatty disease of the heart, in addition to the other kinds of treatment referred to, a stimulant should always be at hand to be administered at the first approach of syncope.

FUNCTIONAL DISORDERS OF THE HEART.

What are called functional disorders of the heart, are in fact only symptoms of obscure organic diseases, of indigestion, or of weakness of the general system from alteration of the blood. They assume three principal forms:—1st, Angina pectoris, or spasm of the muscular walls of the heart, causing excruciating pain and a feeling of sinking difficult to describe. It is generally induced by exertion. We have seen it accompany organic disease of the organ (Case XCV.), and it has been frequently observed in connection with fatty heart and calcareous degeneration of the coronary valve. 2d, In chlorosis, and the anæmia of young women, there are palpitations with a tendency to syncope, accompanied by a blowing murmur at the base, with the first sound, of soft character and not permanent. It is propagated in the course of the large vessels, on placing the stethoscope over which, a continuous buzzing or humming-top murmur is audible (*Bruit de diable* of the French). The cause of this is very obscure, and is by some said to be arterial, and by others venous. (See Diseases of the Blood). 3d, Similar palpitations, often with a small heart, in young men who follow sedentary pursuits, especially students of the learned professions. Their appetite is generally defective, the body weak and indisposed to exertion, the mind and nervous system irritable, and the sleep prevented by the excessive action of and uneasy sensations attributed to the heart.

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* Edin. Medical and Surgical Journal, vol. xxxvii. 1832.

The treatment in all these cases is, when it is dependent on weakness, to increase the vigour of the constitution by nutrients, proper exercise, and the administration of chalybeates. In chlorosis, more especially, the different preparations of iron are beneficial. In young men, regulated exercise, suspension from study, attention to diet, and especially removing the attention from the heart at night by cheerful conversation, or interesting light reading, are the most useful means of removing the disorder. In all cases the concomitant derangements must be studied, and, if possible, removed, such as amenorrhœa, hæmorrhoids, spermatorrhœa, dyspepsia, etc. etc.

ANEURISM.

CASE CII.*—*Aneurism of the ascending Arch of the Aorta—Incompetency of Aortic Valves—Hypertrophy of Left Ventricle.*

HISTORY.—Charles Watt, æt. 31, groom—admitted June 19. During the last eight months has frequently had occasion to lift heavy weights, and has occasionally felt slight pain in the epigastrium. This suddenly became very violent on the 8th of June; and the next day, on walking, he experienced violent dyspnœa. On the 11th he was cupped, with considerable relief. Has been aware of a pulsation in the neck for two years, but never suffered any inconvenience from it. No dysphagia.

SYMPTOMS ON ADMISSION.—The cardiac dulness extends three inches transversely. The apex beats with great force between the fifth and sixth ribs, two inches below, and a little to the left of the nipple. A bellows murmur is heard with the second sound, loudest at the base. The first sound is normal. In the right side of the neck, immediately above the sternum and clavicle, there is a pulsating tumour the size of a hen's egg, extending laterally two inches. It communicates a strong impulse and a peculiar thrill to the hand placed on it, and over it there may be heard a loud hoarse bellows murmur, synchronous with the impulse of the heart, and this murmur may be heard at the back, extending down the course of the aorta. Pulse 74, regular, hard, and jerking, alternating with the impulse at the apex, stronger in the right than the left wrist. Pain in the epigastrium, and dyspnœa on exertion. No other pulmonary symptoms. Frequent pain in the left temple, extending down that side of the nose. Giddiness on rising suddenly. Frequent muscæ volitantes.

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* Reported by Mr. David Christison, Clinical Clerk.

Progress of the Case.—Continued to have pain in the epigastrium, and dyspnœa at intervals. He was treated by occasional small topical bleedings, which always relieved the symptoms. Blisters also were now and then applied, and latterly small doses of aconite given. The physical signs underwent no change, but the distressing concomitant symptoms nearly disappeared, and he felt so well that he was dismissed, at his own desire, July 15.

Commentary.—In this case aortic incompetency was proved to exist by the same sign as we have seen to accompany it in former cases. The visible swelling, diffuse pulsation, and bellows murmur, synchronous with the dilatation of the vessel, could leave little doubt that an aneurism of the aorta existed. It became a question, however, whether the innominata was or was not involved; and I am inclined to consider not, from a variety of circumstances, but more especially—1st, Because the pulse at the right wrist was stronger than at the left; 2d, Because the pain in the head and face was on the left, and not on the right side; and, 3d, Because the bellows murmur over the tumour was superficial, anterior, and propagated down the back in the course of the aorta. In addition, it could be argued that there was neither dysphagia nor dyspnœa, while the respiratory murmurs were equally loud in both lungs. Now aneurisms of the transverse arch of the aorta press against the most convex part of the trachea, which is least liable to compression, whilst the œsophagus at this point is well protected. Hence the seat of the aneurism explains why deglutition and respiration were not interfered with.

Case CIII.*—*Aneurism of ascending Aorta, immediately above the Aortic Valves—Incompetency of Aortic and Mitral Valves—Hypertrophy of left Ventricle—Waxy Kidneys—Pulmonary Hemorrhage—Anasarca.*

History.—Kenneth M'Kenzie, æt. 52, quarryman—admitted October 31st, 1853. Has been more or less subject to rheumatism during the last twelve years. Nine months ago, after much exposure to cold and wet, he complained of unusual palpitation and dyspnœa, and has since been subject to paroxysms of breathlessness, suffocation, and a feeling of extreme anxiety, unattended with cough or expectoration. Three weeks ago a mass of earth and loose stones fell upon his back between the shoulders, and since then, his whole body has been painful and stiff, and the other symptoms much aggravated.

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* Reported by Mr. William Calder and Mr. Almeric Seymour, Clinical Clerks.

Symptoms on Admission.—The impulse of heart is diffuse, raising more especially the fifth and sixth intercostal spaces. The apex beats strongly between the fifth and sixth ribs, in a vertical line below the left nipple. The transverse cardiac dulness begins at the margin of the sternum, and extends three inches and a quarter outwards. On auscultation, a loud, harsh, but somewhat musical murmur is heard at the apex with the first sound, immediately followed by the second sound, which is rather sharp and rough, but without murmur. At the base there is a blowing murmur with both sounds, which are particularly marked over the articulation of the fourth rib with the sternum. Over the great vessels at the root of the neck, a single blowing murmur is heard synchronous with the pulse at the wrist, and this is heard loudest immediately above the sternal end of the clavicle. At this point a distinct impulse may be felt with the finger, and even seen by the eye, but no circumscribed swelling could be made out. A similar impulse and murmur exists above left clavicle, but not so distinct. Pulse 90, strong, and rather jerking. Has frequent palpitation and dyspnœa, sometimes coming on when lying quite still, and always on making any unusual exertion. Percussion over the lungs everywhere good. On the right side, harsh inspiration both anteriorly and posteriorly. Has a copious expectoration of frothy mucus. Breathing somewhat laboured and wheezing. The appetite is not good, but the digestive system is otherwise normal. Has occasional headache and a frequent feeling of dizziness, with muscæ volitantes. Palpitation and dyspnœa, when severe, often occasion faintness. Other functions normal.

Progress of the Case.—During the month of November there was little change in his condition, although the symptoms were somewhat alleviated by quietude and treatment. *December 8th.*—Last night was seized with pains in the right chest, accompanied with great difficulty of breathing. To-day on auscultation, crepitating rale is mingled with harsh inspiration, and sibilant and sonorous rhonchi on expiration. Percussion and vocal resonance good. No rigor or fever. *Dec. 22d.*—Since last report, the attacks of dyspnœa have become more urgent, and now he cannot assume the recumbent posture. Expectoration is copious and slightly tinged with blood. On the 13th, œdema of the ankles made its appearance, and on examining the urine, it was found to be highly albuminous. Pulse 60, jerking. *Dec. 29th.*—Œdema of inferior extremities has now extended to the thighs and scrotum, and is rapidly increasing. Amount of urine passed daily much diminished and highly albuminous. Orthopnœa at night, and great dyspnœa at all times. Sputum largely mixed with blood. Dulness on percussion over lower third of right lung posteriorly. *January 4th.*—Since last report there has been general anasarca, with great distension of the inferior extremities and scrotum. Has been unable to assume the recumbent posture, and been obliged to pass the night leaning forward on a table. The urine has continued very scanty, and the pulse, though still jerking, has gradually become weak. He gradually became exhausted, and died Jan. 9th, at 11 a. m. The treatment consisted at first of abstraction of small quantities of blood from over the heart or lungs, by cupping or leeches, which always produced temporary relief. Expectorants and anodynes to relieve cough, favour expectoration, and promote sleep. Antispasmodics to diminish dyspnœa. When the dropsy appeared, diuretics and afterwards hydragogue cathartics caused relief, and for a time diminished the accumulation of the fluid.

Sectio Cadaveris.—Twenty-five hours after death.

Head.—Considerable effusion in subarachnoid cavity. Lateral ventricles contained ℥iij of clear serum. Brain otherwise healthy.

Thorax.—Heart much enlarged, weighing 28 ounces. This was owing almost entirely to hypertrophy of the left ventricle, its cavity being dilated and walls much thickened. The aortic valves were shortened, thickened, and incompetent. The margins of mitral valve were thickened, and the chordæ tendiniæ shortened and thickened. The lining membrane of the aorta was rough and irregular from atheromatous and calcareous degeneration. Immediately above the sigmoid valve, which is next the right ventricle, was an aneurismal pouch the size of a walnut. It contained no coagula, was formed by a dilatation of all the aortic coats, and its internal surface was rough from atheromatous degeneration. The entire arch of the aorta was also rough from a similar cause, but the descending aorta was normal. Both lungs were œdematous. In the right lung were several masses of coagulated extravasated blood, generally about the size of a walnut.

Abdomen.—The kidneys presented the waxy degeneration. Other abdominal organs healthy.

Commentary.—This case is an example of a commencing aneurism at the root of the aorta, although it, like the last, may be regarded essentially as a cardiac disease, as the physical signs indicated both mitral and aortic incompetency. It was the loud, single blowing, synchronous with the systole, combined with the distinct impulse felt and seen over the clavicle, which pointed to an aortic aneurism. The size of this aneurism could not be large, as percussion failed to detect any dulness over the chest, and although at first he said deglutition had been slightly impaired, this symptom was afterwards ascertained not to be present. The aneurism may have assisted in producing the incompetency of the aortic valves, which, with the aneurism itself, was occasioned by the chronic arteritis, and subsequent atheromatous degeneration of the arch of the aorta. At what time the mitral disease commenced was unknown, but it was comparatively subordinate to the aortic disease, and was followed by hypertrophy of the left ventricle, and the pulmonary complication. The renal lesion came on when he was in the ward, and we need not be surprised at the universal and rapid anasarca which, under such circumstances, proved fatal. Treatment under such circumstances could only be palliative.

Case CIV.*—*Aneurism of Ascending Arch of Aorta—Chronic Pericarditis —Disease of Aortic Valves—Great Hypertrophy of Heart—Anasarca.*

History.—Robert Laing, æt. 53, married, a bookbinder—admitted January 11th, 1854. States that he never had rheumatism, and cannot account in any way for his illness, which he dates from about four months ago; previously to that time he was in the enjoyment of excellent health. Palpitation and dyspnœa were the first symptoms he noticed, and a strong pulsation in the back was observed by his wife. Œdema of the lower limbs came on about a month afterwards, and has since gradually increased. During his illness he was treated with diuretic remedies, which produced temporary diminution of the dropsy. A few days before admission, the dyspnœa became very urgent, but was somewhat relieved by venesection to the amount of a few ounces.

Symptoms on Admission.—The impulse of the heart is weak and diffused, over considerable part of the fifth intercostal space, being felt most distinctly in a line perpendicularly below the nipple. Dulness on percussion extends from the left nipple across the chest, nearly as far as the right nipple; upwards on the left side it extends as far as to the third intercostal space, but above that line percussion is normal. On the right side, dulness extends from apex to base, over a space bounded by the sternum within, and a line drawn vertically through the nipple externally. The heart sounds are much obscured by pulmonary rales; in the usual situation they are feeble, and their precise character cannot be determined. Over the upper two-thirds of the right side of the chest, as far out as the nipple, there is very loud hoarse double murmur; no impulse can be felt in that region. Pulse 76, and of jerking aortic character; regular, and of equal strength on both sides. Posteriorly the chest is resonant everywhere, and loud, sonorous, and sibilant rales are heard; expiration is considerably prolonged. Dyspnœa considerable; there is some cough with frothy mucous expectoration. The inferior extremities and scrotum are enormously distended, and pit on pressure; the abdomen is swollen, and fluctuation can be detected; the face is pale and somewhat sallow. Appetite much impaired; thirst considerable. He can lie only on his back or his right side. Has considerable difficulty in speaking. Urine very scanty and muddy in appearance.

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* Reported by Mr. Robert Bird, Clinical Clerk.

Progress of the Case.—*January 11th to 13th.*—Was treated with antispasmodics and hydragogue cathartics, and afterwards with leeches to the præcordia, which last measure relieved the dyspnœa considerably. On the morning of the 13th, on awakening he called the nurse; immediately afterwards he fell into a state of stupor from which he could not be roused. His pulse was 120, weak the pupils were strongly contracted. Brandy and carbonate of ammonia were administered, but he continued in the same state for two hours, when he died.

Sectio Cadaveris.—Twenty-seven hours after death.

Great anasarca of the body.

Thorax.—The veins of the neck greatly engorged, so that on cutting them across, a large quantity of black fluid blood escaped. On removing the sternum, the pericardium was seen to extend in a transverse direction from nipple to nipple, so as to measure eight inches across. On being opened, it was found to contain two ounces of serum. Over the anterior and posterior surface of all the cavities, but especially the anterior surface of the right ventricle, masses of old lymph were attached—in some places smooth, in others rough and shaggy. The heart was enormously enlarged; the cavities of both ventricles, but especially of the right, were increased in size. Their walls also and the septum were much thicker than natural. The aortic valves were thickened, and could not be applied against the walls of the aorta in consequence of masses of calcareous matter deposited at their bases. The whole internal surface of the aorta was rough and thickened by atheromatous degeneration. Immediately above the semilunar valves was an aneurismal pouch, springing from the aorta. The opening into it was rather larger than a crown piece, and was perfectly round. Above this aneurism, formed by a dilatation of all the coats of the vessel, was another, formed only of the middle and external coats. Into this there were two openings, one about the size of a shilling, the other a fourth of that size. This second pouch was partly filled by coagulated blood. Externally, the aneurism was applied immediately over the right auricle, was of a flattened oval form, and about the size of a cocoa nut. The mitral valve, and those on the right side of the heart, were healthy. The pleuræ on the left side were thickened and universally adherent. At the lower part of upper lobe it was of cartilaginous consistence, over a space the size of a crown piece. The lung was slightly emphysematous at its anterior margin. Bronchi contained muco-purulent matter. The right lung was not adherent anywhere. At the apex were numerous emphysematous bullæ the size of peas. Inferiorly and posteriorly, the pulmonary tissue was collapsed in several places.

Abdomen.—The liver and kidneys were considerably congested; otherwise healthy. Other organs natural.

Commentary.—In this case the aneurism originating from the ascending portion of the aortic arch was the size of a cocoa nut, and was formed on the right side. During the life of the patient it was supposed to be much larger in consequence of the extended dulness, which was afterwards determined to be partly dependent on the dilated pericardium. The chronic pericarditis gave rise to no symptoms, but probably assisted in causing the heart's sounds to be obscured, which, however, were sufficiently masked by the bronchitic rales. The loud double murmur heard on the right of the sternum was most probably owing to the flux and reflux of the blood into the first aneurismal pouch, for although similar sounds might have originated from the diseased aortic orifice, they were rendered inaudible by the pericarditis and bronchitis. The complications here were formidable, and the man died rather from the heart disorder than from the aneurism.

Case CV.*—*Large Aneurism of the ascending Arch of the Aorta, bursting into the Pericardium, and causing Absorption of a portion of the Third Rib—Chronic Pericarditis—Incompetency of Aortic Valves—Hypertrophy of Left Ventricle.*

History.—James M'Killop, æt. 34, labourer—admitted January 12th. He says that he has been much addicted to drink, and that two years and a half ago, while engaged in lifting a heavy weight, he suddenly felt something give way in the region of the left chest. From that period he became subject to a beating in that locality, but suffered no other inconvenience till about four months ago, when he experienced a numbness down the left arm. For the last twelve months he has observed his left chest to be somewhat swollen. Six weeks ago he first felt dyspnœa, which was increased on exertion, and was attended with frequent cough. Two weeks afterwards, he observed his face and neck begin to swell, and this has gradually gone on until now. Has continued to work up to six weeks ago.

Symptoms on Admission.—Apex of heart beats between the fifth and sixth ribs, internal to and below the left nipple. It is feeble and diffused. A heaving pulsation is also felt over the upper part of left chest, synchronous with the cardiac impulse, having also an expansive lateral motion. On percussion, at a level with the nipple, cardiac transverse dulness is three inches. Above this there is a dull space, bounded by a curved line, which passes internally to mid-sternum, superiorly to the lower border of the first rib, and externally as far as a line passing vertically through the left nipple. This space measures four inches from above downwards, and five inches transversely. It bulges forwards visibly more than the corresponding parts on the opposite side, especially in the second intercostal space, two and a half inches from the sternum. On auscultation at the heart's apex, a double blowing murmur is audible, which, however, evidently originates at the base, where it is loudest, the first murmur being rough, and the second comparatively soft. All over the region of the pulsating tumour, there is a double murmur, the first not so loud as the second. They are most distinct towards the outer margin of the dull space formerly described, especially at a point one inch above the left nipple. Over both clavicles there is a single rough blowing murmur. Posteriorly, no comparative dulness can be made out on percussion. On applying the hand at the base of both lungs, fremitus is perceptible with the inspiratory acts, most marked in the left side. On auscultation, a double murmur is audible all over the left back, loudest between vertebræ and the edge of scapula. Radial pulse 108, small but strong, without any difference in the two wrists. Both external jugular veins are somewhat distended, so that the position of the valves may be readily perceived. On auscultation of both lungs, harsh sonorous rales are audible, with occasional undeveloped moist sounds. Expiration much prolonged. Has tickling in the larynx; occasional cough of a hard and somewhat clanging character; expectoration is mucous, not copious; considerable dyspnœa, especially on exertion, and pain in the left chest and shoulder, with numbness in left arm; sleep is disturbed; irides normal; strength diminished; considerable œdema of face, neck, and chest only; eyelids puffy; skin hot; appetite good; deglutition unaffected. Digestive, urinary, and other functions normal. *Eight leeches to be applied over tumour in left chest, and to take a tablespoonful every two hours of the following mixture:*—℞ *Sp. Æther. Sulph.; Sp Ammon. Aromat.* aa ʒj.; *Tr. Card comp.* ʒiij; *Aquæ ad* ℥iij. M.

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* Reported by Mr. H. N. Maclaurin, Clinical Clerk.

Progress of the Case.—*January* 17*th.*—Little benefit followed the application of the leeches. Yesterday, ℥v of blood were removed by cupping, and caused great relief. Œdema of the face lessened. *Jan.* 22*d.*—Complains of pain passing from tumour to middle of left back. *Venesectio ad* ℥x. *Jan.* 24*th.*—℥xj of blood were taken from the arm, causing instantaneous relief from the pain, and tingling in the arm. The relief continued till to-day, when the pain has returned. Pulse 100, sharp. Other symptoms the same. *Morphia and Æther draught.* *Jan.* 29*th.*—Pain continues. Dyspnœa and cough have increased. Face and neck again very œdematous. To be cupped over left chest, and ℥vj of blood taken. *Feb.* 2*d.*—Was again greatly relieved by the cupping. Complains of tickling in the larynx. The tumour has extended somewhat upwards, and its pulsation is distinctly felt at the right border of the sternum opposite the second rib. ℞ *Lobeliæ Inflatæ* ʒij; *Sol. Mur. Morph.* ʒj; *Aquæ ad* ℥vj. M. One tablespoonful three times in the night. Expired suddenly at 7 p.m. on the 8th, the symptoms having undergone little change, and sleep having been procured by xx minims of Sol. Mur. Morph. taken at night.

Sectio Cadaveris.—Thirty-two hours after death.

Body not emaciated. Left side of thorax rather fuller than right.

Thorax.—There was some œdema of the parietes, greater upon the left than the right side. On reflecting the soft parts, there was an evident prominence in the left mammary region, rounded in form, and about two and a half inches in diameter. The pericardium was much distended, and contained twenty ounces of blood. An aneurism arose from that portion of the ascending aorta contained within the pericardium, commencing immediately above the semilunar valves and the origin of the coronary arteries. The aorta below this point was not dilated. The aneurism anteriorly appeared to be divided into two lobes; the left, much larger than the right, and of the size of a large cocoa nut, passed upwards and forwards, its long diameter being nearly parallel to the anterior wall of the thorax, to which the greater part of its surface was adherent; the right, larger than a turkey's egg, passed backwards and a little downwards, its long diameter being nearly parallel to the base of the thorax. The anterior extremity of the right lobe did not approach within two inches of the thoracic wall. Posteriorly no such division into lobes could be seen, but merely a single large aneurismal sac divided into two compartments by the aorta. The left pouch was found adherent to the posterior surface of the sternum, between the junctions of the second and fourth ribs, and to the cartilages and part of the bodies of second, third, and fourth ribs. Over this space, measuring about six inches across, and nearly four vertically, the sac could not be separated from the thoracic parietes; on the contrary, the finger introduced into the sac detected rough exposed bone in various situations, corresponding to the prominence observed. Externally there was a gap in the thoracic wall, formed by the absorption of a considerable portion of the third rib, external to its junction with its cartilage. The recurrent nerves were displaced and stretched, especially the left, in consequence of the transverse portion of the arch of the aorta being pushed backwards. A rupture of the aneurism into the pericardium had taken place at the most dependent part of the larger sac, at a point corresponding to the right margin of the sternum between the junction of the fifth and sixth right costal cartilages with the sternum, but about two inches behind it. The orifice was of a linear form, half an inch in length, and immediately overhanging the right auricle. The sac contained chiefly loose clots, but some imperfect layers of decolorised tough fibrin were in some places adherent to its walls. The heart was displaced downwards and backwards. The larger sac intervened between it and the thoracic walls, so that its base was on a level with the lower margin of the fourth rib, and five inches behind it. The heart was hypertrophied, but as it was kept attached to the preparation, it could not be weighed. The hypertrophy was most marked in the left ventricle. The surface of the heart was roughened by shaggy growths of old plastic lymph, most abundant over the left ventricle. Pericardium not adherent. The aortic valves were evidently incompetent, being opaque, thickened, and shortened. There was a small aneurism of this portion of the arch, between the origin of the innominate and left carotid arteries, and partially involving the commencement of each of these vessels. It was about the size of a large filbert. The lining membrane of the thoracic and abdominal aorta was but slightly atheromatous. The larynx was quite natural. The right bronchus was compressed at the point of adhesion, between the lung and the smaller sac. The substance of the lungs was quite natural. The right pleura contained a pint and a half of clear serum.

ABDOMEN.—Abdominal organs healthy.

Commentary.—In this case, the aneurismal tumour developed itself on the left side, and caused a visible swelling with protrusion in the left chest. It was of larger size, and of older growth than in the previous cases, and by constant pressure forwards on the ribs had occasioned caries and interstitial absorption of the bones. In consequence of pressure posteriorly on the bronchus and recurrent nerve, it occasioned harsh cough and tickling of the larynx. Although here also the aortic valves were incompetent, the sounds were marked by a loud double blowing murmur, evidently connected with the aneurism, because they were audible in the left back. Only one sound, however, could be heard at the root of the neck above the clavicles, owing to a dilatation of the aorta between the innominate and left carotid arteries. In this, as in Case CIV. a chronic pericarditis existed, which was not indicated by any symptoms. The relief to symptoms by small abstractions of blood was particularly well marked, although it is perhaps almost unnecessary to say that the real disease was in no way altered, and continued its march towards a fatal termination.

CASE CVI.*—*Aneurism of the Arteria Innominata.*

HISTORY.—Catherine Syme, æt. 56, a seamstress—admitted May 2, 1853. She says that her habits have always been temperate and regular. Fifteen years ago she had an attack of acute articular rheumatism, which afterwards became chronic, and rendered her incapable of working for eighteen months. For six years past she has been subject to occasional attacks of giddiness and swimming in the head, accompanied by a loud noise like the clanging of machinery. Fourteen months ago, in the night, she was seized with a fit of intense dyspnœa, threatening suffocation and accompanied with a loud crowing noise on inspiration. The attack lasted about eight minutes. Three months afterwards, she experienced a somewhat similar but milder attack, also in the night, during sleep. She now observed that her voice was becoming rough and hoarse; and a few months later, she felt slight difficulty in swallowing, at a point corresponding to the upper border of the sternum. In the early part of January 1853, after unusual exposure to cold, the dyspnœa returned every morning, gradually became urgent, and generally terminated in the expectoration of a small quantity of mucus. There were also palpitations, and she became subject to sudden startings from sleep. A week ago, all these symptoms became so much aggravated, that she was unable to leave her bed.

SYMPTOMS ON ADMISSION.—The cardiac dulness measures two inches across. The apex beats between the fifth and sixth ribs, a little to the inside of the nipple. Heart's impulse is somewhat diffused, rhythmical, and of good strength. A blowing murmur accompanies both cardiac sounds, that with the first sound being loudest at the apex, and that with the second being loudest at the base. Immediately above and towards the outer side of the right sterno-clavicular articulation, a pulsating tumour, about the size of a hen's egg, is visible to the eye. It is felt beneath the sternal and inner portion of the clavicular origins of the sterno-mastoid muscle, presents a distinctly rounded outline, and anteriorly slightly overlaps the trachea immediately above the upper border of the sternum. The impulse is strong and diffused, and a loud, clear, abrupt murmur is heard over it, synchronous with the second sound of the heart. The pulse is regular, 106, of good strength, equal at both wrists. There is a paroxysmal cough, harsh, prolonged, and of a clanging metallic character, always worst in the morning, when it is accompanied by urgent dyspnœa, and a loud crowing inspiration. Sputum scanty and gelatinous, containing a few flocculi of pus. Voice hoarse and weak. Chest everywhere resonant on percussion, but not unusually arched. Respiratory murmurs very faint, but normal in character. Expiration much prolonged. Appetite impaired. When swallowing solid food, she says the bolus seems to meet some obstruction at a point corresponding with the upper border of the manubrium of the sternum. The countenance is anxious, face livid, and the superficial veins of the chest and lower part of the neck are very large and turgid. Sleep restless and easily disturbed. Other functions normal.

PROGRESS OF THE CASE.—The symptoms previously noticed continued, with occasional remissions, until the *20th of June.* On that day, it was observed that the blowing murmur synchronous with the second sound at the base of the heart, was much less distinct, and that the murmur with the first sound at the apex was replaced by one with the second. The veins over the upper part of the chest have been gradually enlarging. On the *6th of July*, a careful examination elicited the following results :—Pulse 88, soft, equal in both wrists. The impulse is very strong over the tumour, and on auscultation there are now heard two sounds, the second being loud, abrupt, and exceedingly clear—no blowing audible. These sounds diminish gradually in intensity as the stethoscope approaches the left edge of the manubrium of the sternum, where the two cardiac sounds are heard quite normal. As the instrument descends towards the heart's apex, the second sound gradually assumes a soft blowing character, which at the apex is loud and distinct. The first sound is quite normal. Posteriorly above the right scapula, the sounds of the tumour are heard at a distance, but disappear towards the centre of the back, and are inaudible along the vertebral column. *July 8th.*—For the last few days the dyspnœa in the morning has been very urgent, and the cough coarser, and of a metallic clanging sound. To day the paroxysm continued 15 minutes, and even now at the visit, the breathing is noisy, laboured, and hurried, the dyspnœa urgent, and the paroxysm of cough severe and at short intervals. She cannot expectorate easily. The voice is feeble, and the countenance expressive of great anxiety. To relieve these symptoms tracheotomy was attempted by Mr. Syme ; but having made two incisions, and cut through the integument and subcutaneous fat, such an amount of venous hæmorrhage occurred that he desisted, applied a ligature to the large veins, and declined to perform laryngotomy. *July 9th.*—The loss of blood caused considerable relief, and she passed a tolerable night. A double blowing murmur is now audible both at the apex and base of the heart. That accompanying the second sound is loudest over the apex, while the one accompanying the first is heard loudest over the ensiform cartilage. *July 12th.*—Last night, about half-past eleven P. M., a severe paroxysm of dyspnœa, threatening suffocation, came on. The house-surgeon, Dr. Dobie, enlarged the incision made by Mr. Syme, upwards, and inserted a common-sized tube into the trachea and larynx, after dividing the cricoid cartilage. To-day she is again better, the operation having been followed with immediate relief. She still breathes, however, with difficulty through the tube. The countenance is livid and anxious, extremities cold, pulse feeble and fluttering, surface bedewed with a clammy sweat. She now gradually sunk, and died at half-past eleven P.M., on the 14th, the embarrassment of the respiration being apparently increased by the difficulty of expectoration. Immediately before expiring, she ejected through the tube about ℥j of dark grey-coloured fœtid pus, of the consistence of thick cream.

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* Reported by Mr. Robert Brown, Clinical Clerk.

The treatment throughout the progress of the case was directed to alleviating the cough and expectoration, by means of anodynes and expectorants, and diminishing the paroxysm of dyspnœa by means of diffusible stimuli. Cupping over the sternum, and the occasional application of leeches, were employed, and for some time these remedies undoubtedly caused great relief. The surgeons of the Infirmary were unanimously of opinion that the aneurism did not admit of relief from any operation. Latterly the propriety of tracheotomy or laryngotomy was discussed as a palliative, and ultimately tried with the effect already described.

Sectio Cadaveris.—Thirteen hours after death.

The edges of the wound through which the larynx had been opened were thickened, the surrounding muscles discoloured and infiltrated with pus.

THORAX. — The heart, aorta, and parts connected with the aneurism, were removed *en masse*, and carefully dissected, with the following results : — the heart and its valves quite healthy, with the exception of slight thickening of the margin of one aortic valve. The arch of the aorta immediately above the valves considerably dilated, and the whole of its internal surface thickly studded with atheromatous and calcareous plates. The whole arteria innominata dilated into an aneurismal swelling of a round and somewhat flattened form, having a diameter of fully three inches. The trachea is pushed by it towards the left side, as represented in the accompanying figure, in consequence of which the incision that was made in the median line during the operation, was within one-eighth of an inch of the aneurism. The tumour, by pressing on the right side of the trachea, caused much bulging into and diminution of its calibre. The left innominate vein was nearly obliterated. The remains of its interior contained a softened clot resembling pus, which communicated by a small opening through the aneurismal sac with a portion of the laminated clot, which occupied about three-fourths of its internal cavity. The opening into the sac from the aorta was about the size of half-a-crown, and presented a sharp circular margin. Posteriorly the nerves were reddened, and for the most part enlarged, and firmly united to the posterior wall of the tumour. The superior laryngeal nerve was healthy, being above the tumour; but the inferior was compressed and imbedded in thickened cellular tissue. The posterior half of right lung was partially covered with recent lymph, not adherent, and the pleural sac contained two or three ounces of sero-purulent fluid. The lower lobe of the right lung was hepatized; and on cutting into it, several abscesses up to the size of a cherry were found. The left lung was œdematous, and its bronchi were filled with muco-purulent matter—otherwise healthy.

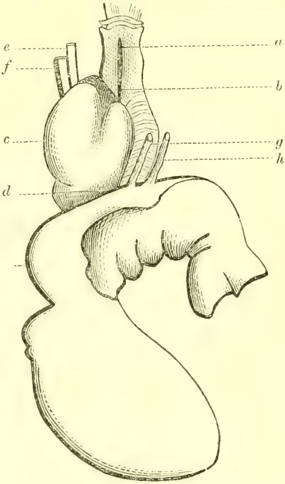

Fig. 395.

Abdomen.—The liver presented the incipient waxy appearance. The spleen was dark in colour and pulpy, almost diffluent in consistence. The kidneys were crowded with minute cysts, and the cortical substance considerably atrophied.

Commentary.—This case terminated in the usual way, by pressure on the nerves of respiration, causing dyspnœa, and at length partial latent pneumonia.

The double clear sound over the aneurismal tumour I have been in the habit of attributing to the flux and reflux of the blood over a sharp vibrating opening into the tumour. In few aneurisms were these

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Fig. 395. Rough sketch of the aneurism and adjoining parts; *a*, opening into the larynx; *b*, line of original incision which inferiorly came close upon the tumour; *c*, aneurismal tumour; *d*, point where the obstructed vena innominata had ulcerated into the tumour; *e*, right carotid; *f*, right jugular; *g*, left carotid; *h*, left vertebral.

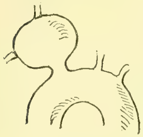

Fig. 396.

sounds more decidedly present than in the case under consideration, and few after death presented an opening having the margin in question better formed. In another case of aneurism of the innominate artery (that of John Hunter), examined at the commencement of the winter session 1856-57, the tumour was very distinct in the neck above the clavicle, but without sound of any kind. It was determined after death that the arteria innominata was dilated to the size of a thumb, and gave origin to the aneurism which was globular and four inches in diameter, without any circular margin, but rather by means of a narrow neck, as in Fig. 396.

The sounds heard over the heart, however, changed their character as the disease advanced. At first, double valvular disease was suspected, but latterly, when the murmurs became reversed, and it was most carefully determined, by repeated examinations, that the murmur at the apex was with the second, and that at the base was with the first, sound, they were attributed to propagation downwards from the aneurismal tumour. I am by no means satisfied, however, that this theory is correct with regard to cardiac murmurs, so distinct as those in the present case, associated with aneurismal tumours and a healthy heart. I content myself, therefore, for the present, with placing the facts on record, as their accuracy is undoubted, and they were confirmed not only by my own repeated examinations, but by those of the clinical class and of the clerks, all of whom took great interest in the case.

The question of putting a ligature on the vessel having been decided by the Infirmary surgeons in the negative, the only other question of treatment was the prolongation of life. The source of danger was evidently the dyspnœa, and the frequent attacks of spasmodic laryngeal obstruction, so common in aneurismal cases from pressure of the tumour on the recurrent nerve. The trachea was also considerably pressed upon and pushed aside, but this could not have accounted for the paroxysms of suffocative dyspnœa, for although diminished in caliber, it was still largely open for the admission of air. On the other hand, the recurrent nerve was found after death thickened, and embedded in dense cellular tissue immediately behind the tumour. Under such circumstances it has been proposed, by passing a tube into the larynx or trachea, to avert the effects of these spasms. In the present case, tracheotomy could not be performed; and whenever the deep-seated venous obstruction is of such a character as to cause enlargement of the superficial veins, laryngotomy is the operation that should be attempted. This at length was accomplished

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Fig. 396. Diagram of an aneurism of the arteria innominata, in which the tumour sprung from the dilated vessel with a narrow neck, and in which no sounds were audible.

with momentary relief; but I have no hesitation in saying that the difficulty of expectoration, and the consequent clogging of the air tubes, led to results equally distressing and fatal as the spasmodic attacks. It has, indeed, been said, that in these cases the operation is generally delayed too long, and that by waiting until there is much secretion of mucus and diminution of strength, no very good effects can be reasonably expected. But in cases of aneurism, it is at best only to be considered as a palliative ; and considering how very difficult expectoration must always be under such circumstances, I consider it very doubtful whether it is ever justifiable except as a *dernier resort.* Certainly the case now recorded is any thing but favourable to the practice.

In this case, it was observable that after the incisions in the integument were made, without tracheotomy having been performed, great relief was occasioned which continued upwards of two days. Was this owing to the few ounces of blood lost during the operation, or to the idea which she had adopted that the operation would cause relief? However it may be explained, there can be no doubt that the excessive dyspnœa and other urgent symptoms were alleviated as if by a charm, in consequence of the unsuccessful attempts to open the trachea.

CASE CVII.*—*Aneurism of Transverse Aortic Arch—Chronic Pericarditis with Effusion—Tubercular Lungs—Anasarca—Former Popliteal Aneurism cured by compression.*

HISTORY.—George Fairweather, æt. 32, a labourer—admitted January 20th, 1854. Originally a farrier, he entered the army in 1839, and served twelve years. In 1842, while in India, he was laid up with rheumatic pains. A year ago, while employed in the Edinburgh police force, he was obliged to run a great distance in the discharge of his duty. Shortly afterwards, an aneurism made its appearance in the right popliteal space. Of this he was cured in the Glasgow Infirmary by means of compression. He has since been troubled with cough and pain in the breast, and between the shoulders. Last August he became very hoarse, and entered the Glasgow Infirmary, where he remained for two months. Towards the close of that period he noticed that his feet were swollen, and began to suffer from palpitation, with pain in the præcordial region. He was dismissed from the hospital as incurable. The swelling in the ankles now increased, and passed up the legs to the abdomen. On the 1st December last he returned to the Glasgow Infirmary, and left it three days ago, without having experienced any relief. Since then his urine has become much diminished, and yesterday it was entirely suppressed.

SYMPTOMS ON ADMISSION.—The point where the apex of the heart beats cannot be made out ; the cardiac impulse is not felt in its usual position ; and the cardiac sounds are inaudible over the region of the apex. At the base of the heart the sounds are quite healthy, and also over the centre of the sternum. The transverse cardiac dulness is fully four inches. There is an unusual dulness above the left nipple, extending over a space about the size of the palm of the hand; here the normal cardiac sounds are heard. They are also heard, unaltered in character, all over the manubrium of the sternum as high as the first intercostal space. Pulse 66, very weak and irregular, and somewhat stronger in the right wrist than in the left. Over the right lung percussion is normal; posteriorly there is dulness at the lower two-thirds of the left side. Loud, sonorous, and sibilating rales audible over most of the chest on inspiration and expiration; the latter movement being much prolonged. Cough troublesome, and accompanied with a peculiar crowing sound. Sputum frothy, gelatinous, and tinged with blood. When the cough comes on he has great dyspnœa, and respiration is accompanied by a wheezing laryngeal sound. He cannot lie upon his right side, from a sensation of choking that comes on; he feels easier when in a semi-erect position, or on the left side; dyspnœa is most troublesome at night. Tongue moist and furred; appetite good; has a feeling of oppressive tightness in the epigastrium after taking food; hepatic dulness four inches; bowels rather loose. A small quantity of urine has been passed since last night; it deposits a pink sediment, which clears up on being heated; sp. gr. 1022. The whole surface of the body is œdematous; abdomen and scrotum much distended; face and hands livid, and cold to the touch; feels cold all over the surface of the body. ℞ *Infus. Digitalis* ℥iss; *Sp. Æther. Nitric.* ℥iij; *Acet. Potassæ* ℥iss; *Aquæ* ℥iv. *M. One ounce to be taken three times a day.*

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* Reported by Mr. Almeric Seymour, Clinical Clerk.

Progress of the Case.—*January 21st to 26th.*—Has continued the above mixture, and was ordered to apply very strong infusion of digitalis over the abdomen. The anasarca is much diminished, fifty ounces of urine having been passed within the last twenty-four hours. Hands rather cold. Physical signs as before. Pulse 120, very troublesome, last night he was ordered a mixture containing *Sp. Æther. Nitric.* of better strength. No difference in the pulse of either wrist. The cough being *and Sol. Mur. Morphiæ.* Considerable dyspnœa after taking solid food. A bedsore has formed on the left gluteal region, from his always lying on that side. ℞ *Potassæ Bitart.* ʒj *quater in dies. Jan. 26th. to Feb. 1st.*—The dropsy has become much less, having entirely left the legs; the size of the abdomen is also diminished; there is more anasarca on the right side of the chest than on the left, on which he generally lies. On one occasion, the amount of urine passed amounted to 150 ounces in the twenty-four hours. On the 31st he had great pain under the left clavicle, with friction at the base of right lung; *six leeches were applied over the painful* spot. As the cough is very troublesome, let him take ʒj *of Tr. Opii Camph. at bed-time. Continue the digitalis internally, but stop the external application. Feb. 1st to 6th.*—Cough has been very troublesome, but has been relieved by *opium. Sp. Æther. Nit. and chloroform internally. 6th.*—The cardiac sounds may be heard, normal in character, over the right side, commencing from the third rib; the impulse may also be seen and felt in that locality. There is also dulness, which may be observed as high as the top of the sternum, extends in a sloping direction to the third rib, and can be elicited down the whole right side. *Feb. 15th.*—Almost total dulness and want of expansion over the left side before and behind; nor is any respiration heard except at the apex. Apply a blister 6 × 5 to the middle and inferior part of the left side. *Feb. 16th to 25th.*—On the 16th had a violent paroxysm of coughing, lasting for ten minutes, and attended with profuse purulent expectoration. Ordered the following:—℞ *Misturæ Scillæ* ℥v; *Tr. Opii Camph.* ℥j. *A table-spoonful to be taken when the cough is urgent. A morphia draught at bed-time.* These remedies relieved the cough. The sputum became more frothy and gelatinous. He also slept better. On the 25th, there is almost total dulness over a space nearly three inches in diameter, in the left sterno-clavicular angle, with gradually increasing clearness towards the outer subclavian space. There is no respiration in the former region, and moderate natural respiration in the latter. In the rest of the left side, in front and laterally, percussion is very dull, and respiration all but absent. There is general dulness, and very feeble respiration in the upper half of the left back, with prolonged sibilation after coughing; respiration is bronchial and feeble in the lower half. On the right side, percussion is clear, with puerile respiration, both before and behind, except for about three inches to the right of the upper sternum, where percussion is somewhat dull. He has still occasionally a difficult and copious expectoration of a tough mucous matter. Cardiac sounds natural, except a very slight tendency to reduplication of the second. *Feb. 25th to March 4th.*—Continued in much the same state till the evening of March 3d, when another fit of coughing and dyspnœa came on. Sulphuric æther, and others of the medicines mentioned above, were administered. He sunk, however, and died at half-past 11 A.M., March 4th.

Sectio Cadaveris.—Forty-eight hours after death.

THORAX.—The pericardium was much distended, and contained 12 oz. of clear serum. Its lining membrane was very hard in some places, by the presence of chronic lymph. The heart and its valves were healthy. Between the arteria innominata and the left carotid was a small dilatation of the arch. Immediately below the origin of the left subclavian, an aneurism, the size of a large orange, of rounded form, and three inches in diameter, originated from the aorta by a thick neck. It pressed forward and to the left side, immediately above the pericardium, slightly compressing the trachea and left bronchus. The recurrent nerve was seen to pass in front of the aneurism uninjured. On examination of the aneurism, it was found that the internal and middle coats of the aorta had given way, the pouch being formed of the outer coat, and of condensed areolar tissue. Above the aortic valves, and over the arch, the inner layers of the vessel were atheromatous. In the cavity of the left pleura were two pints of serum and some chronic bands of lymph. The left lung was universally condensed, and on section was seen to contain a large quantity of tubercle, generally in masses the size of a pea and larger. Some of these had softened, but there was no cavity. The intervening pulmonary tissue was condensed and hepatised. Right lung was voluminous, with a few miliary tubercles scattered through it.

ABDOMEN.—Abdominal organs healthy.

Commentary.—It will be observed in this case, that, during life, it was carefully determined that the cardiac sounds were healthy, that the cardiac dulness was increased to twice its normal extent, and that there was unusual dulness above the left nipple in the sterno-clavicular region. These facts were subsequently explained by the demonstration, on dissection, of a healthy heart, of chronic pericarditis with effusion, and of a large aneurism springing from the transverse aortic arch, stretching towards the left side. Over the aneurism in this case no sounds were audible, a circumstance probably attributable to the thick neck, as explained in the last commentary, by which it came off from the main vessel. The limb, which was the seat of the popliteal aneurism cured by compression, was subsequently injected and dissected with care, and may be now seen forming a very fine preparation in the surgical collection of Mr. Spence of this city. The popliteal artery is completely occluded, the circulation having been maintained through the enlarged anastomosing vessels.

CASE CVIII.[*]—*Aneurism of Lower Portion of the Thoracic Aorta, pressing on the Thoracic Duct—Aneurism of Abdominal Aorta—Chronic Ulcer of Stomach—Chronic Tubercular Abscesses of Liver and Right Kidney—Waxy Liver and Left Kidney—Leucocythemia.*

HISTORY.—Janet Young, æt. 50—admitted June 16th, 1854. States that her appetite has been impaired for the last three years, that she has been subject to chronic rheumatism, and last September had a severe bowel complaint, which lasted fourteen weeks. For the last ten years has suffered from vomiting, which has been more or less constant, and the matters ejected have occasionally been of a dark copper colour. Since the occurrence of the diarrhœa she has become very emaciated.

SYMPTOMS ON ADMISSION.—The whole body is extremely emaciated, and she is very weak. Tongue moist and clean. Appetite pretty good. No vomiting at present. Complains of pain and tenderness in the epigastrium, and on palpation, a distinct tumour can be felt, with a strong impulse, a little to the right of the mesian line in the position of the pylorus. It is apparently solid, of uneven shape, about the size of a hen's egg; but its limits cannot be accurately determined. On auscultation over the tumour, a loud blowing sound, synchronous with the aortic pulse, is audible. Bowels regular. Apex of heart beats between sixth and seventh ribs. Its size and sounds are normal. Pulse 88, of good strength. Respiration and other symptoms normal. *Habeat Tr. Iodid. Ferri Min.* x *ter indies.*

PROGRESS OF THE CASE.—On the 19th of June she commenced vomiting, a symptom which continued, with slight intermissions, during the rest of the month, generally coming on four hours after taking a meal. There was also considerable pain in the region of the tumour, which was relieved by the occasional application of two leeches, followed by warm fomentations. Various remedies were given with a view of checking the vomiting, of which small pieces of ice allowed to dissolve in the mouth appeared most effectual. Nourishment was frequently given in small quantities. During the months of *August* and *September*, the vomiting became far less frequent, although occasionally still distressing. All this time nutrients were constantly administered with wine, and although frequently retained, and even taken with appetite, the emaciation progressively increased. On examining the blood, it was found to possess an increased number of colourless corpuscles. A series of observations also was made to determine whether fat was passed in the fœces, but they were quite healthy, and the bowels on the whole were regular. She also slept well. During the months of *September*, *October*, and *November*, she remained much in the same condition, occasionally complaining of a little more local pain in the epigastric tumour, and latterly of cough and palpitation. For the next three months, there was at times severe vomiting, but otherwise no marked change. During March the emaciation was apparently extreme, the pulse weak, and nutritive injections by the rectum were added to the nutrients and wine given by the mouth. The vomiting was greatly diminished, but for some days she suffered from conjunctivitis. There was also restlessness at night, which was relieved by morphia draughts. Her weakness very gradually increased, and without any other symptom she expired, April 16th, 1855.

Sectio Cadaveris.—Forty hours after death.

THORAX.—Both lungs had some puckerings near the apex, and contained some old tubercular matter. The heart was healthy. Near the lower part of the thoracic aorta was an aneurismal dilatation, about the size of a walnut, which projected to the left of the vertebral column, directly over the thoracic duct, which it appeared to compress.

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[*] Reported by Mr. T. Walker, Clinical Clerk.

Abdomen.—Arising from the anterior part of the abdominal aorta, at the root of the cœliac axis and superior mesenteric artery, was an aneurism of a rounded form, about two inches in diameter, which projected forwards, and was nearly filled with firm layers of fibrin. Both the vessels named were thrust forward, separated to the extent of an inch, but were in themselves healthy. (University Museum, Prep. 2333, *a.*) The stomach was of natural size; on its lesser curvature, about half way between the cardiac and pyloric orifices, but rather nearer the latter, there was an ulcer of an oval form with depressed surface, callous margin and base, and about the size of a filbert. The edges were smooth, as dense as ligament, presented on section a white glistening appearance, and in some places were a quarter of an inch thick. The liver weighed 2 lbs. On section it contained a number of masses of tubercular matter. Some of them had softened and given rise to abscesses. The hepatic tissue itself was waxy. The right kidney was very small, being 2½ inches long and 1¼ inch broad. On section there escaped a yellowish white fluid and some cheesy matter. The tissue of the kidney was quite gone, and its place supplied by the cavities, which presented the usual appearance of scrofulous abscesses. This kidney weighed one ounce. The left kidney was of large size and waxy. The spleen was natural.

Commentary.—On the admission of this woman, it became a question whether the tumour in the pyloric region was an aneurism or a cancerous mass lying over the aorta. The symptoms were those of organic disease of the stomach. As the disease progressed and the emaciation became more urgent, the tumour could be more easily handled, and its rounded form and marked impulse favoured the opinion of its being aneurismal. The frequent vomiting, however, still pointed to disease of the stomach, and served to explain much of the emaciation which existed, but not altogether, as it was observed that she still retained a considerable amount of nourishment, especially at some lengthened periods when the stomach was quiescent. The idea was then formed that there might be some disease at the head of the pancreas, but after careful examination, no unusual amount of fat could be detected in the stools. Latterly the vomiting was comparatively trifling, but still the emaciation was progressive, and became at length extreme. On dissection after death, these facts were explained by the discovery of a small thoracic aneurism pressing upon the thoracic duct in addition to the abdominal one, which had become rounder and harder than when first observed. The lungs and liver exhibited well-marked examples of tubercular and scrofulous deposits which had been arrested in their progress. The diminution of the stomachic symptoms also were accounted for by the gradual healing and cicatrization of the gastric ulcer. It might have been supposed that the abdominal aneurism was progressing towards a spontaneous cure, as it was nearly filled with dense coagulated fibrin. The commencement of a thoracic aneurism above, however, sufficiently accounts for this, as will be explained more particularly in the commentary on the next case.

CASE CIX.*—*Aneurism of the Superior Mesenteric Artery and Aorta—Obscure Aneurism of Descending Thoracic Aorta—Treatment by the method of Valsalva—Pleuritis—Caries of the Vertebræ, softening of the Spinal Cord and Paraplegia—Sudden Death by Poisoning with Tincture of Aconite.*

HISTORY.—Henry Smith, æt. 35, sailor—admitted December 19th, 1849. States that, about twelve months ago, while at sea, he received a severe blow on the back from the tiller of the vessel. He was knocked down, and lay insensible for a short time. Since then he has experienced pain in the abdomen and back, and latterly pulsation in the abdomen, and a sensation of tingling and numbness in the thighs, legs, and feet, especially on the left side. States that about three weeks after the accident, he was admitted into the Liverpool Infirmary, where he remained for about eleven months. He was treated by opiates and other anodynes, and latterly also by leeching and cupping over the pained part of the abdomen. From this treatment he did not receive much benefit.

SYMPTOMS ON ADMISSION.—On admission, he is of a dark complexion; appearance strong and robust. A tumour is distinctly seen pulsating in the left hypochondriac region. It is of an oval form, and measures about three inches transversely; its long diameter cannot be ascertained, as its superior portion ascends below the ribs; but the inferior and lateral margins can be distinctly felt. He complains of great pain and tenderness in the region of the tumour, and of a beating, which is increased on exertion, and also upon assuming the erect posture. He feels easiest when lying doubled up, resting on his elbows and knees, and in this position he is generally seen during the day. The pulsation of the tumour is forcible, synchronous with, or immediately succeeding, the heart's impulse. On auscultation, a soft bellows murmur is distinctly heard over the tumour, and is loudest at the lower part. The apex of the heart beats about an inch below the nipple. Impulse tolerably strong. On percussion, the cardiac dulness extends transversely about two and a half inches. On auscultation, the sounds are normal in character; the first is heard loudest over the apex, just below the nipple; and the second is most distinct at least three inches above and to the inside. He has no cough or expectoration. The right side of the chest is more resonant on percussion than the left, both in front and behind. On auscultation, the respiratory murmurs are normal. Appetite tolerably good. Bowels regular. Urine natural in quantity; sp. gr. 1·025 not coagulable; presents a deposit of lithate of ammonia. *Ordered a morphia draught at night.*

PROGRESS OF THE CASE.—*December* 23*d.*—Has never slept properly since his admission. States that it requires a very large opiate to produce any effect upon him. *Ordered to be bled to syncope*, and his diet to be as follows:—*Breakfast*, Bread, four ounces; milk, eight ounces. *Dinner*, Steak, two ounces; bread, two ounces. *Supper*, Bread, two ounces; tea, eight ounces. 24*th.*—He was bled to thirty ounces, without syncope or nausea being induced. The blood drawn exhibits a distinct buffy coat. Pulse 88, weak and soft. Pain easier, and sleeps better at night. 25*th.*—Dislikes beef for dinner, and would prefer a little rice pudding with the bread at dinner. *To have one ounce of mutton and three ounces of rice pudding for dinner. Twelve leeches to be applied over the tumour.* 26*th.*—Leeches bled freely, and he is now easier. Urine still presents a deposit of lithates. 30*th.*—Complains of constipation; pain in abdomen rather increased. *To have Elect. Sennæ,* ʒj *daily.*

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* Reported by Messrs. H. M. Balfour, W. Clark, and A. Dewar, Clinical Clerks.

Ten leeches to be applied to the region of the tumour. 31*st.*—Leeches did not bleed so well. Pain still severe. *Applicet. Emplast. Cantharid.* 3 × 3 *parti dolenti.*

1850, *January* 2*d.*—Blister gave some relief. Pulse stronger. *Ordered to be bled* ℥xij. 3*d.*—The blood exhibited the buffy coat, but in a less marked degree than formerly. No faintness or nausea was induced. *Two ounces of bread to be taken off his breakfast, and half an ounce off his supper. To be allowed a bottle of lemonade daily.* 7*th.*—Sleeps very badly. ℞ *Sol. Mur. Morph.; Tinct. Hyoscyam.* āā, ʒss; *Aquæ* ℥ss. *M., to be taken every evening.* 9*th.*—Sleeps rather better. Pain in tumour somewhat increased. *Eight leeches to be applied.* 10*th.*—Leeches gave relief. 13*th.* — Still complains of constipation. *To have a colocynth and hyoscyamus pill daily.* 16*th.*—States, that for the last three or four days he has felt much stronger, and the pain and pulsation in the tumour have increased proportionally. *Ten leeches to be applied.* 17*th.*—Leeches gave relief, but still he does not sleep well. 21*st.*—Pulse tolerably strong. *Ordered to be bled to syncope.* 22*d.*—He was *bled yesterday to twenty-six ounces*, without inducing faintness or nausea. To-day his pulse is weak and soft, and he expresses himself much easier. The blood exhibited a distinct buffy coat. Urine loaded with lithates. 25*th.*—Yesterday he was ordered to be bled until some faintness was induced, and 28 oz. were abstracted before that effect was occasioned. To-day the blood is cupped, the pulse weak, and the urine loaded with lithates. *A chloroform draught at night.* 29*th.*—Again bled to 10 oz. *Feb.* 8*th.*—Great pain in the tumour at night, preventing sleep, for which sedative draughts and enemas afford little relief. 20 *oz. of blood were in consequence taken from the arm* to-day, which produced faintness, and at once removed the pain. 19*th.*—Size and impulse of tumour evidently diminished. Does not think he is much weaker since admission, but is unable to sit up so long. Pulse small. To-day pain returned in tumour. 12 *leeches to be applied. March* 2*d.*—*Bled yesterday to* 14 *oz.*, without inducing syncope. Blood not buffed. 10*th*—Pain returned with violence. *Again bled to* 23 *oz.* 19*th.*—*Again bled to* 8 *oz.* He has continued on the low diet, which was altered to-day as follows:—*Breakfast*, 1 biscuit ($1\frac{1}{4}$ oz.), tea, 10 oz.; *Dinner*, 2 biscuits ($2\frac{1}{2}$ oz.), eggs 2; *Supper*, 1 biscuit ($1\frac{1}{4}$ oz.), tea, 10 oz. The analysis of the blood drawn on the 19th is as follows:—

Specific gravity of serum	1028
Solids in 1000 parts:—	
Fibrin	4·6
Globules	42·7
Serous solids	88·2
Water	864·5
Total	1000

April 6*th.*—*Bled again to* 13 *oz.* 15*th.*—Was strong enough to walk in the back-green, but felt exhausted after it. 21*st.*—*Bled yesterday to* 34 *oz.*, at his urgent request, insisting that he felt nothing, until he fell back in a state of syncope, from which he slowly recovered. To-day, appearance anemic, pulse feeble, feels weak. *May* 5*th.*—Has been suffering from constipation, which has been relieved by colocynth and henbane pills. Pulsation in the tumour evidently diminishing. To-day, complains of shooting pains in the back, between the shoulders, and down the arms. As he dislikes the eggs, 4 oz. of calves-foot jelly were ordered instead, the other articles of diet remaining the same. *June* 1*st.*—Considerable pain, and no sleep for three days. 8 *leeches to be applied.* 17*th.*—2 oz. of meat instead of the calves-foot jelly. *July* 17*th.*—Has occasionally been walking a little in the open air, which, however, causes some pain. *Apply* 12 *leeches.* *Aug.* 9*th.*—Pain on walking, caused by hemorrhoids, for which injections of cold water have been ordered with benefit. 16*th.* — Pain in tumour returned. *Apply* 12 *leeches*, which caused faintness, for which ℥ij *of wine* were given. 30*th.*—Went out of the house yesterday by permission. *Oct.* 20*th.*—Has been allowed to go out of the house once a-week for exercise. To-day pain in tumour severe. *Apply* 8 *leeches.* 25*th.*—The tumour was observed to be movable to-day. When he lies on his left side, the prominence is concealed below the cartilages of the ribs, but when he turns on his back, it moves three or four inches towards the right side. He says he has only noticed this mobility during the last week. *Nov.* 20*th.*—Complains of a sharp pain under the left clavicle, and six leeches were applied there in consequence. 26*th.*—Pain under clavicle continues, but was removed by *cupping on the* 22*d and to day.* *Dec.* 27*th.*—*Bled to* ℥viij, to remove pain in tumour.

1851, *February* 17*th.*—Since last report, has continued to feel pain in the tumour. *Again bled to* ℥viij. 20*th.*—Present diet: *Breakfast*, one roll and tea; *Dinner*, part of a fowl and two potatoes; *Supper*, one roll and tea, wine ℥iv. The tumour now feels hard and solid, is the size of a pigeon's egg. *March* 30*th.*—*Bled to* ℥vj. *April* 2*d.*—*Bled to* ℥xij. The bleeding generally relieved the severity of the pain, but on this occasion failed to do so, and *a blister was applied.* *May* 2*d.*—*Bled to* ℥x, with relief. 30*th.*—17 *leeches were applied.* *June* 1*st.*—No relief followed the application of leeches. *To be cupped on the back to* ℥vj. *June* 8*th.*—Pain not diminished, and he was *bled to* ℥xij, which caused great relief. 24*th.*—*Cupped to* ℥viij. 26*th.*—*Bled to* ℥xij. *Oct.* 29*th.*—Bleeding has been occasionally resorted to, to relieve pain; otherwise he has remained the same. Diet at present is: *Breakfast* one roll and a pint of tea; *Dinner*, one flounder and two potatoes; *Supper*, one roll and pint of tea, *brandy* ℥iij. *Dec.* 12*th.*—Since last report has been comparatively easy, getting up daily, and feeling pain only for about two hours after rising in the morning. To-day, the pain having increased, 12 *leeches were applied.*

1852, *January* 10*th.*—Complains of weakness, so that he is obliged to use a stick in walking. 15*th.*—Tumour fully the size of a walnut. Aneurismal murmur greatly diminished. Complains of numbness in left side, and pain in right leg. Walking is more difficult. *Bled to* ℥viij. 23*d.*—Weakness in lower extremities during walking increased. On the 29th, was seized with general coldness, without distinct rigour. He had also severe pain in the left side of the chest, increased on inspiration. 30*th.*—There is frequent cough, and copious expectoration not tinged with blood. The left shoulder is also very painful. Skin hot, total loss of appetite, great thirst, pulse feeble, great prostration. On percussion, the whole of the left side of the chest is dull throughout. On auscultation, the respiration is feeble superiorly, and inaudible inferiorly. A friction noise is heard external to the nipple. No crepitation can be discovered anteriorly or posteriorly. *Mixture of ipecacuanha and morphia ordered.* 31*st.*—Cough and pain diminished. *Feb.* 2*d.*—Sputum slightly tinged with blood. 4*th.*—Cough and expectoration diminished. Sputum consistent, free from blood. Friction still present anteriorly, œgophony posteriorly. 8*th.*—Return of pain in chest and shoulder. Physical signs the same. *Blister to left side.* 16*th.*—Dulness less below left clavicle, and slight motion of ribs observed there during respiration. *March* 1*st.*—Friction now audible over the whole of left side of chest posteriorly, and over apex of lung anteriorly. Percussion clear over upper third of lung, but still completely dull inferiorly. Pain, cough, and febrile symptoms have now disappeared. A bad sore has formed in the sacral region, which has been poulticed, and now exhibits a disposition to slough. The abdominal aneurism has undergone no change. Decided paralysis of motion in the inferior extremities, but their sensibility is unaffected. *March* 8*th.*—Slough has separated from sacrum.

April 8th.—Since last report, paralysis in inferior extremities has become complete. He has lost all voluntary power over them, and when they are pinched or pricked, no sensation is produced. He experienced, however, twitchings and startings in the paralysed limbs, but no pain. His evacuations are passed in bed, and the sore on the sacrum continues to discharge. In this state he continued until May 31st,—the lower limbs paralysed, but, with the exception of increasing weakness, much the same as at last report. To-day he swallowed a considerable portion of a liniment, containing one-fourth of tincture of aconite. He rapidly became pulseless. The intelligence, for three or four minutes, was unaffected. The respiration was embarrassed, and he was dead in a period variously estimated at from five to seven minutes.

Sectio Cadaveris.—Twenty-five hours after death.

Thorax.—General firm adhesions between pleuræ on the left side; on the right side, slight adhesions between pleuræ at the apex. The pericardium contained three and a half ounces of straw-coloured serum; the blood everywhere fluid; heart healthy; right lung mostly crepitant, with considerable induration and puckering at the apex. On section, several cretaceous encysted concretions existed in the pulmonary tissue at the apex, surrounded by considerable carbonaceous deposit. Here and there also small portions of the lungs were collapsed. The left lung somewhat compressed posteriorly, but otherwise crepitant, and apparently normal. It is attached at the posterior part of lower lobe to a sacculated tumour, the size of a fœtal head, in front of the dorsal vertebræ, evidently arising from the descending aorta. The tumour is situated more to the left than to the right side, and, on being cut into, is found to be only partially filled with recently coagulated blood. At that part of the sac which is adherent to the lungs, its wall is strengthened by the deposition of fibrin in laminæ, the whole at its thickest part being an inch thick. The bodies of the 5th, 6th, 7th, and 8th dorsal vertebræ were to a great extent absorbed, being apparently scooped out, leaving the intervertebral cartilages prominent between them. The caries had also affected the heads of the corresponding ribs on the left side. Posteriorly the tumour had projected about an inch, presenting an oval, rounded surface, which had compressed the spinal cord for about an inch and a half of its length opposite the 8th and 9th dorsal vertebræ. On removing and bisecting the cord, its medullary substance at the compressed portion was somewhat softened, an alteration much more marked for two inches both above and below, where it was pultaceous, gradually passing into the spinal medullary matter of normal consistence. The softening was white throughout, with no red spots.

Abdomen.—The pancreas is stretched over an abdominal tumour, the size of a small cocoa nut, in front of the aorta, which is movable, and tolerably resistent and firm. The stomach was healthy, and about a third full of pultaceous lumpy matter, smelling strongly of linimentum saponis. The other abdominal organs were healthy.

On dissecting the tumour, it was ascertained to be an aneurism formed at the root of the superior mesenteric artery, and partly involving the anterior wall of the descending aorta. It was of an oval shape, with one extremity resting on the vertebræ, the other lying immediately below the integuments. Its long diameter measured four, and its transverse three inches. On taking off a thin slice on the left of the tumour, so as not to interfere with the exit of the mesenteric artery, it was seen to be almost wholly occupied by concentric layers of fibrin, except where a channel, larger near the aorta, but becoming smaller at its distal extremity, allowed a free communication of blood with the efferent vessel, Fig. 397. (University Museum, Prep. 2229.)

Microscopic Examination.—Portions of the spinal cord when examined under the microscope, with a power of 250 diameters linear, were everywhere ascertained to consist of broken-up medullary tubes. Many of the varicosities had enlarged and separated, forming round, oval, and variously-shaped transparent corpuscles, with double lines, mixed with fragments of the tubes, and numerous molecules, granules, oil globules, and broken-down ganglionic cells. No granular corpuscles were anywhere visible.

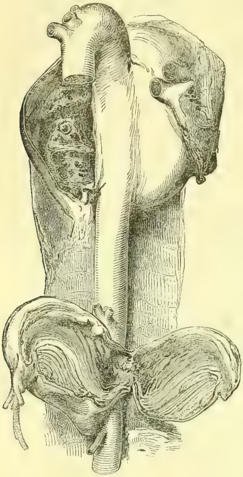

Fig. 397.

Commentary.—This case was in the Infirmary two years and a half, and during the whole of that time its progress excited unusual interest. We had to do with,—1*st*, A thoracic aneurism; 2*d*, An abdominal aneurism; 3*d*, The treatment of aneurism by Valsalva's method; 4*th*, acute passing into chronic pleurisy; 5*th*, Gradually increasing, and at length complete paraplegia; and 6*th*, Poisoning by aconite, and the most rapid death by that drug on record. I shall notice the principal facts of his case in succession, point out the difficulties of the diagnosis, the effects of the treatment employed, and state what occurs to me with regard to the mode of his death.

The Thoracic Aneurism.—The thoracic aneurism in Smith's case was not suspected during life. On looking back upon the facts observed when he was admitted, I find that, after receiving the injury which produced the disease, he complained of pain in the back, as well as the abdomen. It is also stated that, when admitted into the Infirmary, "the right side of the chest is more resonant on percussion than the left, both in front and behind." These facts were too vague at the time to enable me to distinguish a thoracic aneurism in addition to the abdominal one, more especially as the respiratory murmurs were normal; there was no cough, expectoration, or other pulmonary lesion. The idea, therefore, of a thoracic aneurism never occurred to me, nor, if it had, is it likely that it could have been confirmed, although now, on looking back, the importance of the facts above stated are apparent, and prove that such aneurism really existed when he first came into the house. On going over the reports which have been kept of his progress during the two years and a half he has been in the Infirmary,

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Fig. 397. View of the thoracic and abdominal aneurisms, the curious vertebræ, etc.

I find it stated that, on the 6th of April, when under the care of Dr. Christison, he "complained of shooting pains in the back, between the shoulders, and down the arms." On the 20th of November, in the same year, when under Dr. Alison's care, he "complained of a sharp pain under the left clavicle." On both occasions the pain was of short duration. I can find no other symptoms which could be attributed to the thoracic aneurism until the 29th of January 1852, when he was seized with all the symptoms of acute pleurisy. For a long time previously his chest had not been examined, but when, on this occasion, it was percussed, the whole of the left side was found to be dull, both anteriorly and posteriorly. This, as well as all the other symptoms noticed at that time, were ascribed to pleurisy with a large amount of exudation, and on carefully weighing these symptoms and physical signs, I do not see how we could have arrived at any other conclusion; for a pleurisy did certainly exist, as proved by the friction during life, and by the dense chronic adhesions found after death, although now we can have little doubt that the dulness, increased vocal resonance, and other signs, were for the most part dependent on the aneurismal tumour. Another symptom usually present in thoracic aneurism was absent, viz., hæmoptysis, or bloody sputum. On one occasion only was this observed, viz., on February 2d, four days after the pleurisy was established. I remember that it induced me to examine his chest with the utmost care, with a view of discovering if pneumonia also existed; but, as stated in the report, no crepitation could any where be discovered. I am satisfied, from the careful examination at that time, as well as when he first came into the house, that there was no blowing or other abnormal sound in the chest caused by the aneurism. It is not to be wondered at, therefore, that from this period the dulness on the left side of the thorax, unaccompanied with other symptoms, should be referred to chronic pleurisy, rather than to a thoracic aneurism. It so happened, also, that there was a man in the ward labouring under chronic pleurisy on one side, who presented all the thoracic symptoms and signs which existed in Smith. It appears, therefore, that the detection of the aneurism was almost impossible; for, supposing even that it had been suspected and that attention had been directed to confirm such a theory, I am not aware of any arguments by which it could be supported An idea, however, that it would be impossible at any time to discover such an aneurism, would be erroneous, and would do discredit to physical diagnosis; for there can be little doubt that had the chest been carefully re-examined—say a short period *before* the attack of pleurisy—I think it would *then* have been apparent that a tumour existed in the chest, and if so, that tumour, from its seat and concomitant circumstances, would have been declared to be aneurism low down in the thorax. It was simply because no suspicion of its existence occurred to us, and because no physical examination of the chest was made *at that time*, that the tumour was not detected during life.

The Abdominal Aneurism.—When Smith entered the house, the abdominal aneurism was of considerable size. It measured three inches across. Its inferior and lateral margins only could be felt, the superior portions being covered by the ribs. The impression conveyed to me by examining the tumour, however, was that it was about the size of a cocoa-nut. It was prominent, especially when he stood up, and pulsated strongly. There can be no doubt that its volume must have undergone considerable diminution; for, previous to his death, it felt through the integuments about the size of a small hen's egg;—in some of the reports, it is said of a pigeon's egg, and of a walnut. Yet, as you see, it is the size of a large orange, elongated. Its form is a long oval, one extremity of its long axis resting deep upon the vertebræ, the other directed towards the skin. Hence, during life, we could only feel one of its rounded ends. You observe, however, that the whole tumour is dense and resistant,—and on section it presents numerous concentric laminæ of coagulated fibrin, with a small canal running through the centre, keeping up the communication between the aorta and the superior mesenteric artery. The man presented habitually a jaundiced skin, which was doubtless owing to the pressure of the tumour on the duodenum and biliary ducts.

The Paraplegia and Spinal Softening.—He first complained of weakness in the lower extremities early in January 1852; at the end of that month my period of attendance on the wards ceased. In the report of March 1st, I find it stated that there was decided paralysis of motion in the inferior extremities, whilst sensation still resulted when they were touched. On April 8th, the paralysis was complete,—that is, volition failed to cause movement in the lower extremities, and stimuli applied to them failed to induce sensation. Involuntary movements, however, occurred, consisting of twitchings and startings, but he never had pain in the limbs. In cases of myelitis the usual symptoms are, pricking and tingling in the soles of the feet. These symptoms were absent, and the reason of this may, I think, be found in the nature of the softening in the spinal cord. It contained no granular cells, the result of exudation, and its transformation into fatty granules; but the tubular substance of the cord was broken down, forming round and oval fragments of the tubes. Hence it was a mechanical softening, the result of gradual pressure merely. These distinctions have not been hitherto sufficiently attended to in pathology. (See p. 308.) You will observe that the aneurismal tumour commenced pressing on the left side, and from before backwards, and the symptoms indicate that weakness was felt in the left inferior extremity before the right one was affected,—and that motion was paralysed first, sensation last.

Treatment by Valsalva's Method.—A short time previous to the admission of Smith, I treated another case of abdominal aneurism by the method of Valsalva, for a period of forty days,—at the expiration of which time, he walked out of the house, with little assistance, to the nearest cab-stand, a distance of nearly 250 yards, and left the city.* In the case of Smith, therefore, the bleedings were more frequently repeated, and greater in amount, while the diet was even more diminished; and yet, after nearly a month's treatment, the pulse was of such good strength, that I ordered venesection to *syncope*—an effect that was not produced after the loss of twenty-six ounces of blood—so that the clerk, afraid to proceed farther, bound up the arm. Three days afterwards, twenty-eight ounces of blood were removed, with the effect of only producing a feeling of faintness. Similar bleedings were practised at no distant intervals, besides numerous applications of leeches, and the restricted diet; and yet the report of 21st April 1850 is, that "he was bled to *thirty-four ounces*, at his urgent request, insisting that he felt nothing, until he fell back in a state of syncope." I am induced to suppose, therefore, that in this case, as in the preceding one, the treatment had not been carried out to its full extent. The nurse, indeed, now informs me, that perhaps during the first two months his diet was really limited; but she thinks so, simply because, at that period, he suffered great pain, and seemed very anxious to follow the advice given to him. Subsequently, there is every reason to suppose that he obtained food from his companions, or from some other source. I find from the reports, indeed, that whilst his diet was still nominally at a very reduced amount, up to July, he was at the same time walking about with considerable vigour. From my attempts at carrying out Valsalva's treatment in these two cases, I conclude that it is impossible to practise it on patients in an open ward, or indeed under any circumstances, without a degree of *surveillance* that it would be very difficult to obtain.

The good effects of the treatment, notwithstanding its imperfect nature, were so evident as to strike all who witnessed it, and to cause the patient continually to request that he might be bled. In fact, after every general bleeding, the dragging pains, and other uneasy sensations, he experienced in the abdomen, invariably left him, and he enjoyed longer or shorter periods of perfect ease; then, as the pain gradually returned, and it became unbearable, he was again relieved by bleeding; and so on. During the progress of his case, also, it was observed that the abdominal tumour gradually diminished in size, and became harder. In October, the tumour was ascertained by Dr. Christison to be somewhat movable; but in the following December, when I examined it, it was again stationary. During the whole of 1851 he enjoyed comparative comfort,—occasionally, however, feeling abdominal pain, which was relieved by leeches or bleeding. At the beginning of 1852, the general opinion of all who examined him was, that, on the whole, this case was a remarkable example of the good effects of Valsalva's treatment. Then, however, the paraplegia came on, indicating that the disease was really not conquered, but, by its pressure backwards, was affecting the spinal cord. Then came the attack of pleurisy and the paraplegia; and from this period it was evident the disease would terminate fatally.

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* See Monthly Journal, February 1850, p. 169.

The examination of the body after death was, in this case, not only important, as determining the nature of the aneurism, and in a diagnostic point of view; but it served, in my opinion, to point out what value ought to be attributed to Valsalva's treatment. It affords an example of a wide generalisation to which the cultivators of rational medicine have been gradually tending,—viz., that not only is the examination of the body after death necessary for diagnosis and pathology, but that it is essential, in order that we may properly appreciate therapeutics, and the utility of different plans of treatment. Let us suppose, for instance, that this man had died at the commencement of 1852 from the attack of pleurisy, and that, as so often happens, we had been refused permission to open the body, my conviction is, that under such circumstances this case would have been recorded in the annals of medicine as a successful instance of cure by the method of Valsalva. But now, when all the facts are before us, it is evident that the diminution of the abdominal swelling was owing to the increase of the thoracic one; and that, as the force of the current of blood became lessened by the enlargement of the aneurismal dilatation above, so the flow of blood was retarded in the tumour below. In consequence, the concentric depositions of fibrin, the lessened size of the abdominal swelling, and the more permanent relief of pain, instead of being attributable to the treatment, as we had supposed, must now be more rationally ascribed to the increase of a thoracic aneurism, not detected during life, which had produced these results mechanically, and altogether independently of art.

The treatment of internal aneurisms by the method of Valsalva, has for some time been discouraged in this country, on the ground that it gives rise to a general irritability, and to symptoms of a distressing nature, which are often intolerable; whilst, on the other hand, it is seldom attended by a permanently good effect. In the case before us, as well as in that I formerly treated, no unpleasant symptoms could fairly be ascribed to the practice; but, on the contrary, it produced (especially the bleedings) well-marked relief. The question of the permanency of these good effects is, I admit, in no way supported by my experience. But another important practical point, namely, the temporary relief which bleeding causes, without arresting the progress of organic maladies, here meets with an excellent illustration.

Poisoning by Aconite.—The facts which I have been able to make out regarding the unfortunate poisoning of this man are as follows:—On Monday May 31st, about 11 o'clock in the morning, the attention of Mr. Broadbent (non-resident clerk) and of Dr. Murchison (resident clerk), both of whom were at the time in the ward, were directed to

Smith by a groan or cry. He was then observed to be sitting up in bed, leaning forward, and groaning like a man labouring under colic pains. Mr. Broadbent, who was nearest at the time, went to his bed-side, and asked, "What was the matter?" Smith made no immediate reply, but continued to groan, and moved his arms in a feeble manner, and it was noticed by Mr. B. that his hands dropped considerably when the arms were raised. He then tried to reach the spit-box, but not being able to do so, it was given to him, and he seized it, raised it to his mouth, and spat into it. He then said, with short pauses between his words, "Is there anything wrong with my face?—it is very painful; what medicine have I been taking?" On being asked to point out the bottle on the shelf, he did so, saying, "That little bottle there." On looking at it, Mr. Broadbent saw by the label that it was a liniment, composed of Tr. Aconiti, ʒss.; Lin. Saponis. c. Opio, ℥jss. Dr. Murchison, on being informed what had happened, also went to Smith, found him pulseless, and on letting go his arm observed that it fell down powerless at his side. Smith then repeated more than once, "Can nothing be done for me?—What can you do for me?—Can you get me a vomit?" etc. An emetic of sulphate of zinc was immediately sent for, and it was further observed that the pupils had undergone no marked change, that there was no lividity of the lips or other part of the countenance, that no impulse could be felt in the cardiac region, and that the respiration was more slow and laborious than usual. Dr. Murchison now left the patient to get a stomach-pump, and Mr. Broadbent saw Smith retch twice, as if endeavouring voluntarily to vomit. He therefore went into the side-room to get a feather, or some object to tickle his fauces with, but was immediately summoned back by the intelligence that Smith was worse. On returning to the bed-side he found that the patient had fallen on his bed, the head thrown back, face and lips remarkably pale, a little saliva running from the corner of the mouth, the respirations occurring at long intervals with gasping, the pupils neither dilated nor contracted, and the eyelids paralysed, when opened remaining fixed, and not contracting on blowing into the eye. He was now insensible, and consequently the emetic, which at this time arrived, could not be given. About a minute after, Dr. Murchison, on hurrying back with the stomach-pump, found him dead. Notwithstanding, more than a pint of semi-pultaceous matter was immediately drawn off from the stomach, smelling strongly of the liniment, and artificial respiration was kept up in vain for five minutes.

The period that elapsed from first noticing Smith's cry or groan, until Dr. Murchison's return, when he was dead, is differently estimated by the gentlemen concerned at five and seven minutes. The liniment consisted originally of Liniment. Sapon. C. Opio, ℥jss; Tr. Aconiti, ʒss, and it is believed that the whole of this quantity (viz. two fluid ounces), was in the bottle when Smith began to drink it. There were found in the bottle afterwards ʒv remaining,—so that the presumption is, that he swallowed three drachms of laudanum, and upwards of two drachms of tincture of aconite.

Whether Smith's death arose from accident, or whether he committed suicide is not likely ever to be known. Those who knew him best in the ward, as well as the nurse, are of the latter opinion, based principally on the character of the man, which was such as to prevent his mistaking a liniment for a draught. It seems, also, that no one was more habitually careful as to the medicines he took,—that the liniment was not ordered for him; that he took it from a patient in a neighbouring ward, and kept it on his shelf for some days; and lastly, that since the paraplegia had become complete, he had been unusually despondent and morose. With regard to the phenomena produced, it is most likely that, immediately after swallowing the poison, he experienced those violent tingling and stinging sensations in the mouth and fauces which aconite produces, and hence the pain complained of in his face. Being already paraplegic, nothing is known as to how far the poison affected the muscles of the lower extremities; but it is evident that, whilst the intelligence remained perfect, the arms became weak, then powerless. Subsequently, he could not support himself in the sitting posture; and, on his falling back, the muscles of the face and of respiration were paralysed, and he died asphyxiated. Previous to this, however, a powerful sedative effect had been produced on the heart, for when first noticed he was pulseless, and shortly after, no impulse could be felt in the cardiac region.

According to Dr. Christison, the least variable symptoms of poisoning by aconite in the human subject are, "first, numbness, prickling and impaired sensibility of the skin, impaired or annihilated vision, deafness, and vertigo—also, frothing of the mouth, constriction at the throat, false sensations of weight or enlargement in various parts of the body,—great muscular feebleness and tremor, loss of voice, and laborious breathing,—distressing sense of sinking, and impending death,—a small, feeble, irregular, and gradually-vanishing pulse,—cold clammy sweat, and pale bloodless features,—together with perfect possession of the mental faculties, and no tendency to stupor or drowsiness;—finally, sudden death at last, as from hemorrhage, and generally in a period varying from an hour and a half to eight hours."* Although in this case many of the symptoms just mentioned were not noticed, it must be evident that the leading ones, indicative of the physiological action of the drug, were observed. When the large dose of the poison is considered, and the great rapidity of its effects, it may be easily understood how the minor symptoms, and especially those having reference to the sensations of the patient, were not ascertained, if indeed they really existed.

Dr. Fleming considers that aconite may cause death, "first, by producing a powerful sedative impression on the nervous system;

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* On Poisons. Fourth Edition. P. 871.

second, by paralysing the muscles of respiration; and third, by producing syncope." He observes, "that the second mode of death has never been recognised in man; the quantity of the poison taken in no case having been sufficient to exert such an effect on the nervous and muscular systems, as is necessary to induce it."* The case of Smith, indeed, is the only one of this description, so far as I am aware, that has ever occurred, in which the dose of poison was so large, and the death so rapid. It is difficult to separate the effects of syncope from those of asphyxia in such a case, as the first condition must induce the other. Both were apparently combined. It is also difficult to determine how far the effects on respiration were occasioned by paralysis, creeping from below upwards, as in the case of Gow, formerly given (Case XLIII., p. 413). There are some facts, however, noticed by Dr. Christison, which lend support to this doctrine; and it will be observed that paralysis of the hands and arms preceded that of the muscles of the back and face in the case of Smith.

The general diagnosis of thoracic aneurisms has always been considered a matter of great difficulty. When, indeed, a tumour with a distinct impulse is perceptible, we, in the majority of cases, know with what disease we have to do. But even here occasional errors by men of the greatest experience have sufficiently proved that the art of detecting these tumours with exactitude has been wanting. Again, when aneurismal tumours are seated at the upper part of the thorax, it is important to determine whether they arise from the aorta, or from the large vessels coming from it, and if the latter, which vessel is affected. Then aneurisms originating from the upper part of the descending aorta press upon neighbouring nerves, as the superior and inferior laryngeal and pharyngeal branches of the pneumo-gastric, giving rise to various symptoms; or they compress the larynx, trachea, bronchus, œsophagus, or the lung itself, and so occasion laryngeal, œsophageal, or pulmonary symptoms. Lastly, when deep in the thorax, their progress is often latent. Hence the signs and symptoms of thoracic aneurisms vary,—1st, According to their seat; 2dly, According to the size of the tumour and its pressure upon neighbouring parts; 3dly, On the character of the aneurism, its formation, and state of the vessel.

The means at our disposal for detecting these aneurisms are,—1st, Percussion; 2d, Auscultation; 3d, Palpation; 4th, Symptoms.

1. *Percussion.*—That the situation and size of the aorta can be accurately determined by percussion, was first proved by Piorry.† I have frequently succeeded, in favourable cases, in marking out on the chest the size of this vessel. To do so with accuracy, it is first necessary to limit the margins of the heart in the manner previously

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* An Inquiry into the Physiological and Medicinal Properties of the Aconitum Napellus. Edinburgh, 1845. P. 42.

† De l'Examen Plessimetrique de l'Aorta, etc. 1840.

explained (see p. 44), and then carrying the pleximeter upwards in the course of the aorta, and over the sternum, the dulness of the vessel when compared with the resonance of the lung on both sides, may be made very apparent. In the same manner, the extent of saccular, or simple aneurisms by dilatation may frequently be determined with accuracy when seated in the ascending or transverse arch. In such cases, however, the existence of pain often renders percussion impossible, and at all times it should be conducted with great gentleness. When an aneurism is seated in the descending thoracic aorta, its limitation is more difficult, as we have then to percuss through the lung anteriorly. But careful manipulation, and varying the force of the blow, together with percussion posteriorly, will frequently enable us to determine the position and size of the swelling. If, on the other hand, the aneurism be small and deep-seated, while the lungs are healthy, and if, at the same time, no suspicion of the disease be entertained by the practitioner, he is very likely to overlook the importance of slight dulness on one side of the chest.

2. *Auscultation.*—There may be no sounds heard over an aneurism, but when present they may be single or double. Considerable discussion has taken place, whether, in the latter case, the second sound originates in the tumour, or is propagated along the vessel from the heart. This is a theoretical point which is not yet decided. Whether single or double, they must be judged of according to their character and seat. With regard to their *character*, they may be,—1st, Soft and blowing; 2d, Harsh and rough, when the vessel is generally diseased, and its lining membrane more or less atheromatous or calcareous; 3d, There may be a peculiar clink, or abrupt harsh resonance, approaching towards, but never reaching, a metallic sound. It is generally heard when a saccular aneurism, free from coagula, is present, with a small opening, having thin and elastic margins. With respect to the *seat* of these sounds, when near the heart, they are generally synchronous with those of that organ, and their discrimination is very difficult. When situated in the arch of the aorta, there is a distinct separate source of sound. This latter can only be successfully studied by carefully comparing the moment of impulse of the heart with that of the tumour, as well as the character and intensity of the cardiac and aneurismal sounds. You should carry the stethoscope carefully from one to the other, and observe the diminution and increase of the murmurs, as you lengthen or shorten the distance from the origin of the sounds. It is necessary also to study the direction in which the sounds are propagated, those of a blowing or rasping character having a tendency to pass in the direction of the current of blood. Hence in aneurisms of the innominata, the murmur is prolonged in the course of the right carotid and axillary arteries, while those of the aortic arch, and especially its descending portion, may be heard in the aorta, on applying the ear to the back. In this manner careful and *repeated* auscultation, conjoined with

percussion, will enable you, in the majority of cases, to determine exactly, not only the existence and seat of the aneurism, but in many cases its form and structure.

3. *Palpation.*—When an aneurism points externally, a tumour and an expansive impulse can be felt by the hand.

The position of the tumour varies according to the part of the aorta, or the large vessel from which it originates. Thus, saccular aneurisms immediately above the aortic valves pass downwards. When situated in the innominata, they manifest themselves above the clavicle on the right side. If originating in the transverse portion of the arch, there is often no external tumour; and when it does occur, it generally appears on the left side of the sternum, above or below the sterno-clavicular articulation. Aneurisms lower down in the arch are most common in the left thoracic cavity. These rules are by no means absolute; for, although an aneurismal tumour for the most part tends to enlarge in the direction in which the impulse, from the course of blood, is applied—this, in several cases, cannot be determined in the living body.

The impulse of the tumour is synchronous with, or follows the systole of the heart. Occasionally there is no impulse, a circumstance most frequently observed when the tumour does not present externally, and is only determined by percussion. The pulse of arteries connected with the aneurism may be weakened or retarded. The pulse at both wrists should be always carefully studied; for if one be weaker than the other, it is clear that an interruption exists in the current of the blood in the axillary artery. This may arise from two causes,—1st, From the vessel being involved in the tumour; 2d, From its being compressed by it externally. The former condition exists most commonly when there is aneurism of the innominata, when the weaker pulse will be on the *right* side. In aneurisms of the arch, on the other hand, the feebler pulse is usually on the *left* side. The retardation of the pulse, when it occurs, is owing to causes very similar to those which affect its strength.

4. The *symptoms*, which are present in cases of thoracic aneurism, vary according to the size of the tumour, and the parts on which it presses. When seated at the upper part of the chest, it may, by pressure on the larynx, produce alteration of the voice, more or less cough, and stridulous respiration; by affecting the branches of the eighth pair, occasion increase or diminution of their special functions; impede deglutition by constricting the œsophagus; or modify the respiratory murmur by pressing on the trachea or larger bronchi. Occasionally there is a crepitating murmur in the lung, with many of the signs and symptoms of pneumonia, for which it has often been mistaken, including rusty sputum, dulness, and increased vocal resonance. Pressure of the tumour on the axillary vessels and nerves may induce more or less œdema of the extremities, and paralysis more or less complete. Sometimes there are dull, gnawing, or lancinating

pains in various parts of the chest; but nothing is more remarkable than the size and formidable nature of some aneurisms which have caused little pain. Occasionally there is a feeling of oppression and constriction—dyspnœa with or without exertion, and hæmoptysis to a greater or less extent.

The combination of the results obtained by percussion, auscultation, palpation, and vascular impulse, and the functional symptoms, vary infinitely in different cases, and their careful detection, combined with a knowledge of physiology, will in the majority of cases enable us to form a correct opinion as to the nature of the disease. It must not be forgotten, however, that there are some cases which have been so obscure as to baffle the efforts of the most able physicians; and that, generally speaking, the deeper the aneurism the greater the difficulty of detecting its exact nature, and the complications connected with it. It is also well ascertained that the symptoms may be simulated by a tumour situated outside and upon the vessel; and occasional mistakes, made by the most experienced surgeons,—men who, during their professional lives, have carefully examined a large number of these tumours,—prove the excessive difficulty of detecting aneurisms, even when situated in the limbs or in the neck. How much more difficult must be the appreciation of these symptoms, when the aneurisms are below the sternum or clavicles, not to speak of their occurrence deep in the thorax. Yet these very symptoms, when *combined with* percussion and auscultation, enable the physician frequently to overcome the greatest difficulties, and to demonstrate what may properly be called the greatest triumph of his art.

The physical phenomena most distinctive of an *abdominal* aneurism are a swelling more or less defined, an expansive impulse on applying the hand, and a bellows murmur synchronous with, or immediately following, the heart's systole on applying the stethoscope. This bellows murmur is generally loudest over the tumour, and is propagated down the aorta—although, when immediately below the diaphragm, it may be confounded with the first sound of the heart. The symptoms are very various, consisting of dragging, or other pain, more or less acute and prolonged, owing to pressure and stretching of the neighbouring nerves, together with functional disturbance of one or more of the abdominal viscera. Various cases on record, therefore, have presented a train of very anomalous symptoms, and at various times been considered as different diseases by medical practitioners. A complete re-investigation of the symptoms and signs of abdominal aneurisms is much required. This is a task, however, which will require a thorough knowledge of all that is now known of physical diagnosis and morbid anatomy, combined with great powers of observation, and such opportunities as fall to the lot of few individual members of the profession.

The pathology of aneurisms is sufficiently treated of under the heads of "Vascular Growths," p. 190, and of "Fatty Degeneration of Blood-vessels," p. 228. The latter, by inducing weakness or want of elasticity in the vascular wall, permits of its dilatation by the successive impulses of the blood on the enfeebled tissue. Occasionally the inner coat of the vessel is lacerated by external violence, or by sudden exertions, when a similar morbid condition gives rise to like results. As the aneurismal tumour enlarges, it presses more and more upon neighbouring parts, giving rise to atrophy, ulceration, and interstitial absorption of parts, and occasioning a great variety of symptoms, according to the situation of the tumour, the organs and tissues influenced by it, and the amount and kind of pressure exerted on the textures concerned in the functions of nutrition and innervation.

The treatment of aneurisms may be curative or palliative. The former is carried out by the surgeon. The general treatment by Valsalva's method has already been alluded to (p. 578), and is now seldom practised. All the physician can do is to palliate symptoms, diminish the chances of rupture, and favour the obliteration of the enlarged vessel; to this end enjoining quietude, especially avoidance of sudden or long-sustained exertion. Occasional local and even general bleeding, topical applications of ice or warmth as may be found most useful, and sedatives, tend to diminish pain. Constipation should be carefully guarded against, and healthy nutrition secured by attention to the various animal functions, gentle exercise, etc. etc.

SECTION VII.

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DISEASES OF THE RESPIRATORY SYSTEM.

In this, as in the preceding section, it will be well to introduce the study of individual diseases by a short enumeration of the general rules established for the diagnosis of lesions of the Respiratory System. They are—

1. A friction murmur heard over the pulmonary organs indicates pleuritic exudation.

2. Moist, or dry rales, without dulness on percussion, or increased vocal resonance, indicate bronchitis, with or without fluid in the bronchi.

3. Dry rales accompanying prolonged expiration, with unusual resonance on percussion, indicate emphysema.

4. A moist rale at the base of the lung, with dulness on percussion and increased vocal resonance, indicates pneumonia.

5. Harshness of the inspiratory murmur, prolonged expiration, and increased vocal resonance confined to the apex of the lung, indicate incipient phthisis.

6. Moist rales, with dulness on percussion, and increased vocal resonance at the apex of the lung, indicate either advanced phthisis or pneumonia. The latter lesion commencing at or confined to the apex is rare, and hence these signs are diagnostic of phthisis.

7. Circumscribed bronchophony or pectoriloquy, with cavernous dry or moist rale, indicate a cavity. This may be dependent on tubercular ulceration, a gangrenous abscess, or a bronchial dilatation. The first is generally at the apex, and the two last about the centre of the lung.

8. Total absence of respiration indicates a collection of fluid or of air in the pleural cavity. In the former case there is diffused dulness, and in the latter diffused resonance on percussion.

9. Marked permanent dulness, with increased vocal resonance, and diminution or absence of respiration, may depend on chronic pleurisy, on thoracic aneurism, or on a cancerous tumour of the lung. The

diagnosis between these lesions must be determined by a careful consideration of the concomitant signs and symptoms.

The general diagnostic indications now noticed as being derivable from physical signs, admit of several exceptions, which, however, it would be difficult to systematize. Hence, they can only be acquired from a careful study of individual cases. It is important also to remember that these signs should never be relied on alone, but be invariably combined with a minute observation of all the concomitant symptoms. Thus the signs indicative of incipient phthisis may be induced by a chronic pleurisy confined to the apex, or by retrograde tubercle. In either case, the previous history, age, etc., may enable you to determine the nature of the lesion. Again, it may be impossible at the moment of examination to distinguish between two diseases. For instance, there may be general fever, more or less embarrassment of the respiration, and pain in the side, accompanied with no dulness on percussion, but with a decided abnormal murmur, difficult to characterise, as being a fine moist rattle, or a gentle friction sound. Under such circumstances, the progress of the case will soon relieve you from any doubt as to whether a pleurisy or a pneumonia be present. The alterations which occur in the physical signs during the progress of the case also will indicate to the pathologist the changes which occur in the physical conditions and morbid lesions of the lungs. Thus the fugitive dry or mucous rales heard during a bronchitis, point out the occasional constrictions and obstructions in the bronchial tubes. The fine crepitation of incipient pneumonia, passing into absence of respiration, and this again into crepitation, will satisfy him as to effusion, solid coagulation, and subsequent softening of the exudation. In the same way, by an accurate appreciation of physical signs, and a thorough knowledge of morbid anatomy, the practised physician can tell the abnormal conditions produced by phthisis, pleurisy, etc., and judge from the symptoms the effect of these upon the constitution, with a degree of accuracy that to the tyro must appear to be marvellous. All such knowledge can only be acquired by constant examination of the patient on the one hand, and by a careful study of morbid anatomy in the pathological theatre on the other.

LARYNGITIS.

CASE CX.*—*Acute Laryngitis—Treated by Topical Applications—Recovery.*

History.—Alexander Flint, æt. 27, a salesman—admitted February 17, 1851, suffering from extensive lupus of the face, severe diarrhœa, Bright's disease, and scrofulous caries of the left knee-joint. Under appropriate treatment the diarrhœa ceased, the lupus was cured, and the disease of the kidney much alleviated.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Symptoms of the Attack.—On the 24th of May, about three months after admission, he first complained of dry cough and slight pain in the throat, with difficulty of deglutition. These symptoms were increased on the following day; and on examination, the mouth and fauces were unusually red, with minute florid elevations scattered over the mucous surface. Notwithstanding the application of leeches, and sponging the fauces with a solution of the nitrate of silver, the laryngitis progressed.

Progress of the Case.—On the 14th of June the pain and difficulty of deglutition had increased, and his voice had become indistinct and hoarse. The cough also continued, but was now attended with a difficult expectoration of muco-purulent matter. On the 30th of June, notwithstanding the assiduous use of astringent gargles, occasional sponging of the fauces with solution of nitrate of silver, and the application of leeches, he was evidently worse, and he could only speak in a whisper. *July 6th.*—To-day Dr. Horace Green, of New York, who went round the wards with Dr. Bennett, stated that this was a remarkably good example of what he had named follicular disease, affecting the larynx. He passed the sponge, saturated with a solution of nitrate of silver (℈ij to ℥i of water), through the larynx into the trachea. The patient could not take a breath for some seconds afterwards, and described the sensation as like that produced by a piece of food "passing down the wrong way, and causing choking." The immediate effect of the operation was decided improvement of the voice, and more ease in deglutition. From this time his symptoms gradually left him. On the 10th, the sponge was again passed into the larynx by Dr. Bennett, and produced the same sense of temporary suffocation; but immediately afterwards he spoke with perfect clearness of voice. The application was made every second day until the 16th, when all the laryngeal symptoms had disappeared, the voice was normal, and there was no cough, expectoration, pain, or difficulty of deglutition. He now left the house; the disease in the joint had made considerable progress, but the renal disorder was much alleviated.

Case CXI.*—*Chronic Laryngitis—Topical Applications—Recovery.*

History.—Helen Guthrie, æt. 24, married, a fisherwoman—admitted July 4th, 1851. Four months ago was seized with a cough, attended with hoarseness of the voice, dryness of the throat, painful deglutition, and pain in the larynx, which symptoms have continued with greater or less intensity up to the period of admission. Latterly, there has been considerable expectoration of purulent matter, often tinged with blood.

Symptoms on Admission.—On admission, she complains of cough coming on in paroxysms, dryness in the throat, and pain in the larynx, voice cracked and occasionally absent. There is no difficulty in swallowing, but copious expectoration of frothy mucus. Can inspire without difficulty. Percussion over chest elicits nothing abnormal. On auscultation, the inspiratory murmur is harsh over superior third of chest on both sides. Over larynx and trachea there is heard a dry snoring sound. On examining the fauces, red patches were observable here and there, with slight erosion on the left side. The fauces and epiglottis were sponged with a solution of nitrate of silver (℈j to ℥j of water).

Progress of the Case.—The application was repeated on the following day, and the voice was evidently improved. On the 6th, the sponge, saturated with the solution, was passed into the larynx by Dr. Horace Green, of New York, and produced no feeling of suffocation whatever. It was passed afterwards every day by Dr. Bennett till the 14th, when she left the house, all the laryngeal symptoms having disappeared, and the voice nearly restored to its proper tone.

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* Reported by Mr. D. O. Hoile, Clinical Clerk.

Commentary.—The two cases above recorded point out to you in a very marked manner the great advantage to be derived from the method of local application to the larynx, introduced by Dr. Horace Green, of New York. This practice consists in the direct application of a solution of nitrate of silver to the interior of the larynx and trachea, by means of a bent whalebone probe, with a piece of sponge fastened to its extremity. Numerous attempts had been made, with more or less success, by Sir C. Bell, Mr. Vance, Mr. Cusack, and MM. Trousseau and Belloc, to carry this practice into effect, and the results obtained, even by their imperfect efforts, exhibited the great advantages which were to be derived from it in the treatment of laryngeal diseases. Now, thanks to Dr. Green, we can with safety apply various solutions directly to the parts affected, and the two cases you have observed must convince you of the benefit which patients so treated may obtain. In Case CX. you have observed the progress of a tolerably acute case of laryngitis from its commencement to its termination,—the distressing symptoms produced, and the loss of voice occasioned. You have remarked, I trust, the gradual increase of the disorder, from its commencement on the 24th of May until the 6th of July, when you saw Dr. Green himself pass the sponge into the larynx, and the immediate effect it occasioned. Lastly, from that moment you saw the case get better, and its termination in perfect cure eight days afterwards. No stronger evidence could be offered you in any single case of the benefit to be derived from a local application, especially when it is considered that the usual treatment was actively employed, consisting of leeches externally, gargles, and the application of a strong solution of nitrate of silver to the fauces, pharynx, and epiglottis. It was only when the application was made directly to the part affected that good was obtained. The second case, though more chronic, and though she went out before a perfect cure was obtained, is also calculated to impress upon you the value of this treatment.

The instruments to be employed, are, first, a tongue depressor, with a bent handle, such as I now show you, by means of which the tongue can be firmly pressed down, so as to expose the whole of the fauces, and the upper edge of the epiglottis. In doing this, some patients experience no inconvenience, whilst in others there is such excessive irritability, that spasmodic cough or even vomiting is occasioned, which prevents the possibility of seeing the epiglottis. Secondly, a whalebone probang, about ten inches long, having at its extremity a round piece of the finest sponge, about the size of a gun or pistol bullet. The probang, towards the extremity, must be bent in a curve, which, according to Dr. Green, ought to form the arc of one quarter of a circle whose diameter is four inches. Sometimes the curve must be altered to suit particular cases; and when it is thought necessary to pass it into the trachea, the curve must be considerably less. It is important that the sponge be fine, and capable of imbibing a considerable quantity of fluid; that it be *sewn* firmly to the extremity of the whalebone, and that this last should not be cut in the form of a bulb, but tapered as much as is consistent with firmness.

The solutions of the nitrate of silver which will be found most useful are of two strengths. One is formed of ℈ij and the other ʒj of the crystallised salt to an ounce of distilled water. On some occasions a solution of the sulphate of copper has been found beneficial, and it is very possible that as our experience of this kind of treatment extends, the application of other substances in solution may be found capable of meeting particular indications. Some have used Tr. of Iodine, others, solutions of various salts, and Dr. Scott Alison, in cases of great irritability, has recommended olive oil.

The method of introducing the sponge which I have found most successful is as follows :—The patient being seated in a chair and exposed to a good light, you should stand on his right side, and depress the tongue with the depressor held in the left hand. Holding the probang in the right hand, the sponge having been saturated in the solution, you pass it carefully over the upper surface of the instrument, *exactly in the median plane*, until it is above or immediately behind the epiglottis. You now tell the patient to inspire, and as he does so, you drag the tongue slightly forwards with the depressor, and thrust the probang downwards and forwards by a movement which causes you to elevate the right arm, and brings your hand almost in contact with the patient's face. This operation requires more dexterity than may at first be supposed. The rima glottidis is narrow, and unless the sponge come fairly down upon it, it readily slips into the œsophagus. Its passage into the proper channel may be determined by the sensation of overcoming a constriction, which you yourself experience when the sponge is momentarily embraced by the rima, as well as by the momentary spasm it occasions in the patient, or the harsh expiration which follows,—symptoms which are more marked according to the sensibility of the parts.

If the probang be properly prepared, and the operation well performed, the actions which take place are as follows :—1st, The sponge, saturated with the solution, is rapidly thrust through the rima into the larynx, and frequently into the trachea ; for if the distance of the probang be measured from that portion of it which comes in contact with the lips, the extent it has been thrust downwards can be pretty accurately determined. I am persuaded that on many occasions I have passed it pretty deep into the trachea, not only from the length of the probang which has disappeared, but also from the sensations of the patient, although this may be thought by some a fallacious method of determining the point. In this first part of the operation, the rima glottidis is, as it were, taken by surprise, and the sponge enters, if the right direction be given to it, without difficulty. But 2d, the rima glottidis immediately contracts by reflex action, so that on withdrawing the instrument you feel the constriction. This also squeezes out the solution, which is diffused over the laryngeal and tracheal mucous membrane. Now, if the sponge be a fine one, it will be found capable of holding about ʒss of fluid, the effect of which upon the secretions and mucous surface almost always produces temporary relief to the symptoms, and strengthens the tone of the voice,—results at once apparent after the momentary spasm has abated. 3d, The action of the nitrate of silver solution is not that of a stimulant, but rather that of a calmative or sedative. It acts chemically on the mucus, pus, or other albuminous fluids it comes in contact with, throws down a copious white precipitate, in the form of a molecular membrane, which defends for a time the tender mucous surface or irritable ulcer, and leaves the passage free for the acts of respiration. Hence arises the feeling of relief almost always occasioned, with that diminution of irritability in the parts which is so favourable to cure, and why it is that strong solutions of the salt are much more efficacious than weak ones. It may be easily conceived that such good effects must be more or less advantageous in almost all the diseases that affect parts so sensitive, from whatever cause they may arise; and that this treatment is not only adapted to one of the diseases of the larynx, but, like all important remedies, meets a general indication which the judicious practitioner will know how to avail of himself.

The mucous membrane of the larynx consists of ciliated epithelium externally, a basement layer below this, and areolar tissue internally, richly supplied with blood-vessels. Scattered over its surface are numerous follicles, which secrete mucus. It is liable to the same structural alterations as all other similar membranes, which may be divided into—1st, Exudation, into the areolar tissue between the basement membrane and epithelium, or upon the external surface; 2d, Abrasions or desquamations of the epithelial layer; 3d, Ulcerations extending more or less deep into the areolar tissue; and 4th, Obstruction, swelling, and subsequent ulceration of the mucous follicles, a lesion particularly described by Dr. Horace Green, and denominated by him "follicular disease of the air passages." These different lesions may be more or less complicated with each other, and will vary in intensity according to the rapidity of their progress, and the extent to which the mucous membrane is implicated. Sometimes the exudation is thrown out quickly and infiltrates the textures, as in œdema glottidis, or in malignant angina. At other times it is poured out on the surface as in croup. More frequently it is partial, occasioning subsequent abrasion or ulceration, and the acute disease becomes chronic. Perhaps the most common form it assumes is when it is chronic from the commencement, sometimes dependent on atmospheric changes, at other times on repeated attacks of "cold"; in a third class dependent on too much straining of voice, as occurs in public speakers, clergymen, singers, etc., and occasionally it is connected with some general constitutional disorder, as syphilis, tuberculosis, or some form of cancer. All these forms of laryngeal disease may be further associated with similar lesions of the fauces, tonsils, uvula, and pharynx.

The symptoms will of course vary according to these different circumstances. The acute forms are accompanied with general fever, considerable local pain, more or less obstruction to deglutition and respiration, and loss or alteration in the character of the voice. As a general rule, it may be said that lesions of the fauces, tonsils, and neighbouring parts, are indicated by greater or less difficulty or uneasiness in swallowing, whilst the laryngeal disorder is evinced by changes in the character or power of sustaining the voice. Then, as a general result of the local irritation, spasmodic action is evinced, and we have cough, at first dry, but afterwards attended with mucous or purulent expectoration, and not unfrequently with discharge of blood. Elongation of the uvula may produce these effects. It has been lately supposed that hooping-cough is only an obscure form of laryngeal disease. In the more acute and extensive cases of exudative laryngitis, the spasms are more violent and prolonged, and the greatest caution is necessary in watching persons so affected, lest, from sudden and continued closure of the glottis, fatal asphyxia be induced. The following case is very instructive in this point of view.

Case CXII.[*]—*Acute Œdema of the Glottis—Chronic Pharyngitis and Laryngitis—Sudden Death.*

History.—Frances Nichol, æt. 25, a shoe-binder, married, was admitted in the evening of February 27, 1851, complaining of sore throat, but breathing easily, and otherwise presenting no urgent symptoms. She has suffered from cough upwards of four years, had secondary syphilis, and ulcerations in the throat for twelve months.

Symptoms on Admission.—At the visit I found her breathing to be laborious and noisy; cough frequent; expectoration difficult, with frothy sputum tinged with blood; countenance anxious; lips livid; pulse 130, small and soft; cannot speak nor can any one give any account of her. On examining the mouth and fauces, the mucous membrane was seen to be covered with tenacious muco-purulent matter. The soft palate is perforated by ulcerations the size of a pea in three places; there is another ulcer the size of a fourpenny piece on the roof of the mouth. The tonsils and mucous membrane surrounding the glottis were somewhat swollen, but not unusually red. On percussing the chest, no dulness could anywhere be detected. Respiratory murmurs over the large air-tubes loud and harsh, with occasional mucous rale, but their character masked by the loud snoring noise in the larynx. *To have ℥ss of wine every half-hour; an antispasmodic mixture of sulphuric æther, ammonia, and opium; the ulcers and mucous membrane of the fauces to be sponged with a weak solution of nitrate of silver, and the steam inhaler to be used assiduously.*

Progress of the Case.—These remedies alleviated all her symptoms, so that in the evening she gave a history of her case. Seeing that she was so much better at the evening visit of the house-clerk, the intensity of the disease was supposed to have abated, but in the morning she was found dead in bed.

Sectio Cadaveris.—Fifty hours after death.

Pharynx, Larynx, and Trachea. — The opening of the fauces was considerably contracted ; and the mucous membrane of the tonsils, soft palate, and from this to the root of the tongue, presented numerous ulcerations, extending to the submucous tissue, and undermining to some extent the mucous membrane. The ulcers were mostly rounded in form, of exceedingly various size, up to a diameter of three-eighths of an inch ; the edges not at all elevated, and for the most part smooth, as though scooped out by a punch. The floors of the ulcers consisted of the submucous tissue, perfectly clean and pale, without the least trace of granulations or pus. The neighbouring mucous membrane was scarcely at any point more vascular than natural. The aryteno-epiglottidean folds were hypertrophied,—that of the right side being thickened and œdematous, that of the left being flaccid and relaxed. They could be made to lie in apposition, so as almost to close the opening of the glottis. The mucous membrane of the entire larynx was somewhat rose-coloured ; and the submucous tissue of the epiglottis, the chordæ vocales, and the ventricles, considerably infiltrated with fluid. Throughout the trachea, the membrane was of a rose colour, becoming deeper towards the bronchi, and was everywhere covered with a thick mucus, which lay in semi-transparent drops, the size of a very small pin's head, on the opening of the follicles.

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[*] Reported by Mr. Henry Thom, Clinical Clerk.

Thorax.—The tissue of the lungs was for the most part healthy, but here and there a few small portions of its substance were collapsed. The mucous membrane of the larger bronchi was congested, and the smaller ones on the right side yielded drops of purulent mucus, on compressing the cut surface of the lung.

Abdomen.—There were several small cancerous nodules in the liver, but all the other organs were healthy.

Commentary.—In this case I think there can be little doubt that during the night some obstruction occurred to the breathing, dependent on the local disease, which caused asphyxia and death. Neither can we have any hesitation in thinking, that had tracheotomy been performed in time, life would have been saved, inasmuch as the tissue of the lungs was healthy, and the only lesion found in those organs was a trifling bronchitis. No doubt the amelioration of the symptoms which was observed at the evening visit removed the idea of urgency, but this is just the reason I have cited the case, as a lesson to all of us, with regard to the watchfulness which is necessary in the treatment of such disorders. In another case, occurring in a man who entered the clinical ward, labouring under symptoms so similar that I need not detail them, I ordered tracheotomy to be performed at once, and the result was the preservation of life and restoration to health, although the ulceration destroyed the vocal cords, and the aphonia was complete.

Case CXIII.*—*Chronic Laryngitis and Pharyngitis—Tracheotomy—Recovery.*

History.—Hugh Martin, æt. 35, labourer—admitted December 28th, 1849. Says, that six years ago he had gonorrhœa, without any other form of venereal affection. Twelve months since, he was treated with calomel for some swellings below his jaw, and shortly after having caught cold, was affected with sore throat.

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* Reported by Mr. Hugh M. Balfour, Clinical Clerk.

Subsequently he was again treated with mercury in the Glasgow Infirmary, and having again caught cold, his throat became worse.

Symptoms on Admission.—His general appearance is cachectic and emaciated. His speech is almost inaudible, and portion of a large ulcer is seen deep down in the pharynx. Respiration is evidently impeded and accompanied by hoarse tubular breathing, heard on placing a stethoscope over the larynx. Pulmonary sounds feeble, and resonance good everywhere on percussion over the lungs. Has slight cough with muco-purulent expectoration, not so copious, he says, as it has been. Has pain in deglutition, which often excites violent cough. Pulse 82, of natural strength. Other functions well performed. The urine contains hexagonal plates of cystine, mingled with crystals of uric acid.

Progress of the Case. — *December* 30*th.* — Topical applications of a weak solution of nitrate of silver internally, and warm fomentations to the throat externally, have failed to cause relief. Breathing still impeded and difficult ; voice extinct. *Tracheotomy was performed, and a tube inserted. January* 11*th.*—Since the operation, he has breathed freely through the tube, and feels much easier. The ulcer in the pharynx has been touched occasionally with nitrate of silver, and is now healed. Has considerable difficulty in expectorating mucus through the tube. To have steak diet. *Dec.* 20*th.* — *A solution of nitrate of silver,* (2 *gr. to* ℥j *of water*) *to be applied to the inside of the trachea every other day, by means of a sponge attached to a slip of bent whalebone. Dec.* 23*d.* — Has been greatly relieved by the topical application to the trachea. *Strength of solution to be increased to Argent. Nit.* gr. v. *to* ℥j *water, and applied daily. Dec.* 26*th.* — *Strength of solution further increased to* gr. x. *of the salt to* ℥j *of water.* From this time, the muco-purulent expectoration gradually subsided. ℞ *Potass. Iodid.* ʒss ; *Tr. Gent.* c. ℥j ; *Inf. Gent.* c. ℥v. *M.* ℥j *to be taken three times a day. February* 10*th.*—The tube was removed. The voice returned, although it remained very hoarse, and there was every reason to believe that the ulcer in the larynx, if not perfectly cicatrized, was nearly so, when he went out, February 20th.

Commentary.—In this case, tracheotomy was performed, not so much with the view of relieving urgent symptoms, as to secure rest and immobility to the larynx, so that the ulcerations might cicatrize. This object was effected, and the man slowly got well. First, the ulcer in the pharynx healed, and subsequently that in the larynx, although, when the tube was removed from the trachea, it was apparent that the vocal cords had been partially destroyed. At the time this case was treated, the mode of application by means of sponges to the interior of the larynx was unknown. The record shows, however, that in 1849, I applied a nitrate of silver solution directly to the trachea, through the aperture made for the tube, which was from time to time removed for that purpose. I then found its use very beneficial in checking the amount of muco-purulent secretion, and increased the strength of the solution from two to ten grains of the salt to an ounce of water. The man complained of no pain or inconvenience of any kind from these applications. He had undergone two courses of mercury, and so far as his own statements are to be relied on, without any other form of venereal disease than that of gonorrhœa, and swellings below the jaw. Even supposing that these latter were originally venereal, it is certain that the mercury produced no benefit, but, on the contrary, while the local disease was making progress, it so affected his general health, as to occasion emaciation and general cachexia. We have seen that the ulcers healed under a non-mercurial treatment, and that his health improved under tonics and good diet.

The diagnosis of laryngitis is most important, and must be derived,—1st, From the general symptoms; 2d, From the results obtained by careful examination of the air-tubes and lungs by auscultation and percussion; and 3d, From an inspection of the parts. With regard to the general symptoms, I have already alluded to the relative value to be attached to difficulties of deglutition and of speech. Concerning the difficulties of respiration, the nature of the expectoration, and the cough, we cannot with certainty refer them to the larynx, without a careful study of the condition of the pulmonary organs. Indeed, the attention which has been lately directed to the fauces and larynx, in consequence of the writings of Dr. Horace Green, has demonstrated the important fact, that many of those disorders which have been sometimes called "chronic bronchitis," and others which have not unfrequently been supposed to indicate in young persons incipient phthisis, are really a chronic form of laryngitis, altogether local, and readily removed by topical applications. The distinction between them, however, often demands the greatest care in examination, but when *a good auscultator* fails to detect the signs characteristic of bronchitis or phthisis pulmonalis, whilst, on the other hand, there is unusual hoarseness or shrillness of the laryngeal murmur, dryness of the throat, and hacking cough, sometimes accompanied by muco-purulent expectoration, or even occasional spitting of blood, then his suspicions may be directed to laryngeal rather than to pulmonary disorder. It is the more important to notice this, because a good authority has lately stated,—"Expectoration of blood in persons labouring under chronic bronchitis, with or without emphysema, but without notable disease of the heart, justifies in itself a suspicion of the existence of latent tubercles." (Walshe.) In making this diagnosis, however, I must recommend to you the exercise of the greatest caution, and especially not to confound the natural hoarseness heard in the larynx of some individuals with the coarse sounds heard in others only when the organ is diseased.

The examination of the throat and upper edge of the epiglottis will do much to remove any difficulty you may experience, because in many cases alterations in the mucous membrane of the larynx follow and accompany similar changes in the mucous membrane of the fauces and pharynx. Indeed it may be accepted as a general law, which admits of but few exceptions, that morbid changes in the mucous membranes of the pharynx and larynx proceed from above downwards, as is well observed in scarlatina. Lesions often attack the fauces or tonsils and spare the larynx; but if long continued, the latter is affected consecutively. Hence why chronic, syphilitic, and mercurial ulcerations of the throat, have such a tendency to attack the larynx. Again, when the larynx is first attacked, as occurs among clergymen, and in the ordinary croup of children, the follicular disease in the one, and the coagulated exudation in the other, tend to pass down the trachea, and not upwards into the fauces. It follows, that when hoarseness of the voice, cough, and other laryngeal symptoms are accompanied by abrasions or ulcerations in the mucous membrane of the soft palate or uvula, by thickening or irregularity in the epiglottis, and especially by the follicular disease formerly alluded to—presenting elevated pimples more or less numerous scattered over the parts—there is every reason to believe that the larynx is similarly affected. The tongue-depressor previously referred to will enable you to examine these parts with the greatest ease, and in most cases the upper edge of the epiglottis will with its aid be brought into view. Still it is only by inference that we can form an opinion of the condition of the larynx. Indeed in many cases, even the summit of the epiglottis cannot be seen, the larynx being so deep-seated that it cannot be brought into view with the tongue-depressor. Hence, as regards the actual examination of the mouth and throat, we only receive exact information as to the state of the fauces, uvula, tonsils, and back of the pharynx, and valuable as such information is, we cannot determine by it with exactitude the condition of the glottis. Occasionally, under such circumstances, the finger will give us some notion, however vague, and we may feel swelling, induration, or irregularity in the epiglottis. But to derive information in this manner, tact and habit are necessary. On the whole, although the local examination with the tongue-depressor should never be omitted, it does not in all cases enable us to determine the condition of the epiglottis. In no case ought you to depend upon examination of the parts alone: it should be conjoined with the knowledge derived from a careful study of the symptoms, and of the physical signs furnished by the air-tubes and lungs.

With regard to the treatment, you will gather from what has been previously said, that I regard the mode of applying topical remedies introduced by Dr. Green as a most valuable addition to our other means of cure. The experience of that physician indicates, that the earlier it is applied the greater the chance of success, especially in acute cases of scarlatina and croup. It was first employed in hooping-cough by Dr. E. Watson of Glasgow, and has subsequently been tried in laryngismus stridulus, hay fever, and other diseases hitherto considered spasmodic, and with such success, as to lead to the conclusion that these disorders are essentially connected with local irritations or an obscure form of catarrh. In various kinds of laryngeal disease occurring in the adult, whether primary or secondary, I have employed it very extensively, in many instances with permanent good results, and in a large number with temporary alleviation. Indeed, nothing is more remarkable than the immediate effect it has in clearing the throat and improving the tone of the voice, and hence, in many cases which do not admit of cure, it may be employed as a palliative. As such, I have successfully used it in old cases of chronic laryngitis and bronchitis, clergyman's sore throat, spasmodic asthma with accumulation of mucus in the trachea, and so on. In syphilitic and confirmed tubercular laryngitis, though not so beneficial, it is still in some cases decidedly useful. I have, however, met with several instances where it has been very injudiciously employed, and others where the sponge had been passed by unskilful hands repeatedly down the œsophagus without any good effect, the patient having been persuaded for a considerable period that it had been applied to the larynx. Circumstances of this kind may bring the practice into disrepute with some, but I trust you will discriminate, and neither lightly abandon it from a few failures, nor be led into the opposite error, of supposing, from one or two favourable cases, that it is capable of being invariably successful.

BRONCHITIS.

CASE CXIV.*—*Acute Bronchitis—Recovery.*

HISTORY.—Catherine Mulvie, æt. 21, a servant—admitted July 21, 1851. She states that two weeks ago, when in a state of perspiration, she took a bath in the open sea. The same evening she was attacked with rigors and other febrile symptoms, and on the next day there was a dry cough, difficulty of breathing, and a sense of oppression in the chest. The cough has continued since, with more or less expectoration, but the febrile symptoms have abated.

SYMPTOMS ON ADMISSION.—On percussion, there is no unusual dulness over the lungs. On auscultation, there is harshness of the inspiratory murmur anteriorly; and posteriorly and inferiorly, on both sides of chest, coarse crepitation. There is frequent cough, with slight muco-purulent expectoration; general debility; headache; soreness in the limbs; occasional palpitations of the heart, the sounds of which organ, however, are healthy. Pulse 62, full. Digestive and genito-urinary systems normal.

PROGRESS OF THE CASE.—Under the use of small doses of antimonials with opiates, followed by expectorants, the pulmonary symptoms rapidly diminished. On the 23d the coarse crepitation had nearly disappeared, and the expectoration was much diminished in quantity. On the 25th the respiratory murmurs on the right side were healthy, and on the left side there only remained slight harshness with occasional fine sibilation on inspiration posteriorly. Cough and expectoration were so trifling that she was dismissed.

Commentary.—This was an uncomplicated case of acute bronchitis, which had nearly run its course before admission. It presents an average specimen of a class of cases exceedingly common both in hospital and private practice. The repose of the house, aided by expectorants and opiates, sufficed for the cure.

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* Reported by Mr. D. O. Hoile, Clinical Clerk.

CASE CXV.*—*Acute Bronchitis.*

HISTORY.—Martin Conolly, æt. 25, a robust labourer—admitted May 15th, 1857. On the 7th of May, after working some days standing in water, he had a rigor, with great heat of skin, followed by profuse perspiration, but no headache. He continued at his work till 10th May, when he was confined to bed, the pain having got worse. Cough commenced the previous day accompanied with a thick yellow sputum, and these symptoms with dyspnœa have gradually increased in severity up to his admission.

SYMPTOMS ON ADMISSION.—Form of chest unusually rounded and well developed. Anteriorly, percussion is clear on both sides. On auscultation, inspiration is shortened; expiration prolonged, and accompanied by long sibilant and sonorous rales. Vocal resonance weak, but equal on both sides. Posteriorly there is clear resonance on percussion on both sides. On auscultation, the same sibilant and sonorous rales accompany expiration, and are occasionally but rarely heard with inspiration, which at the right base is accompanied by moist rales. Cough and dyspnœa urgent. Respirations 36 per minute. Expectoration gelatinous and muco-purulent. Cardiac sounds somewhat masked, but normal. Pulse 122, strong, full, and regular. Skin hot, but otherwise normal. Tongue moist and clean. Appetite much impaired. Thirst great. Bowels regular. Urine high coloured, otherwise normal. Venesection to 14 oz. was practised by Dr. Bennett without any immediate relief, and ℥ss of the following mixture ordered to be taken every four hours. ℞ *Aquæ Acetatis Ammoniæ* ℥iss; *Spirit. Æther. Nitrici* ʒij; *Vin. Antimonial* ʒij; *Aquæ ad* ℥vj. In the evening, dyspnœa had much diminished. Respirations 24 per minute. Pulse 108, still regular, full, and strong. Heat of skin less.

PROGRESS OF THE CASE.—Next day improvement was found to continue. Pulse 116, full, but softer than yesterday. Sibilations no longer audible with expiration. The moist sounds are fainter and less abundant than at last examination. *May 18th.*—Sibilant and cooing rales accompany both respiratory acts posteriorly. Anteriorly these sounds are less intense, but are accompanied by fine crepitus. Under the left nipple, crepitus is mixed with a certain harshness, both on expiration and inspiration (friction?) Urine rendered turbid by the presence of urates. Pulse 116, of the same character as yesterday. *May 19th* (twelfth day of the disease).—Patient was found bathed in profuse perspiration. The moist sounds are diminishing in amount. Crepitation still audible under left nipple. Patient still complains of pain in that region, but there is no friction. Cough continues, but is less severe. Sputum still copious and muco-purulent. Pulse 102, soft. Appetite improving. Skin moist. Urine throws down a copious sediment of urates. *May 21st* (fourteenth day).—Patient still perspires profusely. Crepitation with fine sibilus still heard anteriorly, most distinctly under left nipple. Pain in left side continues, being most severe on deep inspiration. Sputum diminished in quantity, muco-purulent. Pulse 100, soft and full. On the 25th, moist rattle had nearly disappeared. On the 29th, sibilations were very faint, the cough was trifling, and sputum nearly gone. *June 4th.*—He was discharged quite well.

Commentary.—This was a case of violent acute bronchitis of both lungs, in a strong vigorous man. On admission, so great was his dyspnœa, that I bled him with a view of determining whether the remedy would relieve that symptom. I satisfied myself that it had no immediate effect, and the disease subsequently ran its natural course, terminating in perfect recovery on the twenty-first day.

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* Reported by Mr. W. H. Davies, Clinical Clerk.

Bronchitis, like laryngitis, consists of an exudation infiltrated into the various tissues forming the bronchi, or coagulated upon their mucous surface. It terminates in the transformation of this exudation—according to laws previously explained, p. 135, *et seq.*—into matters which permit of its being either absorbed into the blood or expectorated. At first the lesion causes increased dryness, narrowing, and rigidity, and subsequently moisture, dilatation, and relaxation of the tubes. Owing to these changes, the vibrating sounds caused by the passage of air through the bronchi undergo variations, which indicate pretty clearly the dry or moist nature of the disease, or, as some term it, dry or moist catarrh.

Acute bronchitis may differ in intensity, from an affection very trifling and scarcely regarded, to one which very nearly approaches in severity a decided attack of pneumonia. It may be epidemic, and constitute what is called *influenza.* It may follow or precede a similar lesion in the lining membrane of the nasal passages, that is *coryza.* These affections are so common as to be generally treated by domestic medicines only, or, it may be, totally disregarded. But there can be no doubt that a disposition to attacks of this kind, though they may often occur for a long time with impunity, frequently leads to the incurable and distressing change of pulmonary texture known as *emphysema*, with its fearful accompaniment of spasmodic asthma and consecutive disease of the heart. (See p. 552.) Bronchitis, therefore, is an affection which, if not checked early, should be carefully assisted through its natural progress.

To check the progress of an acute bronchitis or coryza, no remedy seems so good as taking a full dose of morphia on the first, or at latest second night, on going to bed. In the morning the patient should breakfast in bed, and keep himself warm at home during the next day. This treatment, which was first recommended by Dr. Christison, has the effect of diminishing the irritation which causes the exudation, and preventing its return. Should, unfortunately, the disease progress, patience is perhaps the best remedy, as the disease will run its course. But if the bronchi become clogged, sudorifics and expectorants, especially ipecacuanha, will be useful, and a blister will sometimes dissipate any lingering trace of the disease. The chief caution to be given should be to get perfectly rid of the disorder before any exposure to cold air be allowed. It is the disregard of this point, and the getting "cold upon cold," which serves so much to keep up the affection, and at length induces the chronic form of the disease.

CASE CXVI.*—*Chronic Bronchitis—Acute Peritonitis—Collapse of the Lung.*

HISTORY.—Mary Nicol, æt. 21, a servant—admitted July 8th, 1851. She has suffered more or less from cough for the last two years. Occasionally it has been very troublesome, but not accompanied by much expectoration. Seven weeks ago experienced severe pain in the epigastrium, and since then the breathing has become short and hurried.

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* Reported by Mr. C. D. Phillips, Clinical Clerk.

Symptoms on Admission.—Anteriorly the lungs are everywhere resonant on percussion. On auscultation, the inspiratory murmur is harsh, and towards its termination fine sibilant rales are heard. Posteriorly, the right side is more dull on percussion than the left. This is more marked towards the apex. At this point there is harsh inspiration and increased vocal resonance. There are also, over the whole right back, sibilant rales during inspiration. Cough with trifling mucous expectoration ; respirations short and hurried ; great tenderness over the epigastrium, increased on taking a deep inspiration; appetite tolerably good; no nausea or vomiting, and, with the exception of constipation, digestive system healthy ; pulse 80, soft; heart sounds natural; catamenia regular; urine voided with pain, and in small quantity, otherwise healthy.

Progress of the Case.—The dry rales accompanying the inspiration continued for some days; but on the 21st they became moist, and coarse crepitation was audible over the inferior third of right back. The cough became more loose also, and the expectoration increased. On the 24th, the moist rattles were converted into deep sonorous murmurs, and great variations were heard from day to day, evidently in consequence of the greater or less amount of fluid in the bronchi. The cough and expectoration also varied greatly in intensity. Her principal complaint however, was the epigastric pain, which, notwithstanding the application of leeches, warm fomentations, opiates, and counter-irritants, continued to increase. On the 28th, there was diffuse swelling of the abdomen, general tenderness of the surface, and all the symptoms of peritonitis from intestinal perforation. Latterly, there was dulness and absence of respiration over the lower third of right lung. She died August 10th, 1851 ; but unfortunately no dissection could be procured.

Commentary.—This girl laboured under a chronic bronchitis of some standing, which presented, during the progress of the case, most of the physical signs characteristic of the disease. Her chief complaint, however, was a fixed pain in the epigastric region, which proved in no way amenable to treatment, and which, as the event proved, was evidently connected with an ulcer either in the stomach or neighbouring intestinal viscera, probably the former, considering the frequent occurrence of ulcers in that viscus among servant girls. But in the absence of the facts which a dissection only could have afforded, all speculation on such a point is evidently useless. The dulness on percussion at the apex of the right lung, the harsh inspiration and increased vocal resonance, point to the existence of some condition of the organ at that point, giving it increased density. They constitute the signs of incipient or of cretaceous tubercle. But percussion over the whole of right back was impaired; and towards the close of life, as weakness appeared, there was dulness and absence of respiration over the lower third of right lung. These physical signs indicate collapse of the organ in this situation, or a condition which has been variously called by pathologists "condensation"—"infarction"—hypostatic pneumonia"—"peripneumonie des agonisans," etc. etc.

In a series of observations on bronchitis, by Dr. W. T. Gairdner,* he points out, as one of the most common results of the disease, more or less collapse of the vesicular tissue, dependent on obstruction to the passage of air during inspiration, by glutinous or inspissated mucus. This collapse is often confined to individual lobules, which are condensed, comparatively heavy, indurated to the feel, of dark colour, and present the usual characters of the unexpanded portions of lung in the newly-born infant (*atelectasis*). Doubtless, also, such collapsed lobules have often been mistaken for lobular pneumonia, or pulmonary apoplexy in children. Dr. Gairdner has further recorded facts, which render it highly probable that this collapse becomes more diffused in chronic cases of bronchitis, when a large bronchus is obstructed, as represented Fig. 398, and when, from the weakness of the individual, from abdominal disease, or want of resistance in the thoracic walls, the patient is unable to clear the air-passages by a strong expiratory effort. Hence why this lesion is common in fever, in bronchitis accompanying peritonitis or ascites, and in young children. The case recorded is evidently one where, from the physical signs and other symptoms, we can have little doubt that collapse in the right lung occurred to a considerable extent.

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* Papers in Monthly Journal for 1850.

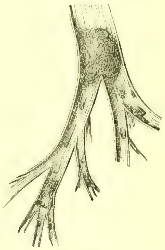
Fig. 398.

Case CXVII.*—*Chronic Bronchitis—Emphysema—Acute Laryngitis.*

History.—Edward Jackson, aged 22, a robust negro, cook to a vessel—admitted February 14, 1851. He says that three months ago, when at sea, he first began to suffer from cough, expectoration, and shortness of breath, which symptoms, notwithstanding various remedies given him by his captain, have continued to increase up to the present time.

Symptoms on Admission.—Anteriorly the thorax is unusually arched from above downwards. On percussion, there is everywhere loud resonance, especially in front. On auscultation, the expiration is much prolonged, and accompanied by sibilant and sonorous rales, louder and more general on the right side. There is frequent and prolonged cough, accompanied by copious frothy mucous expectoration, great dyspnœa on making an exertion, and occasionally coming on in paroxysms without any obvious cause. Cardiac sounds normal. Pulse 80, strong. Frequently vomits after a severe fit of coughing; but the digestive and other systems are otherwise healthy.

Progress of the Case.—In addition to the dry rales heard when he was first examined, it was soon ascertained that copious coarse moist rales appeared posteriorly and inferiorly, especially on the right, but also on the left side. These

* Recorded by Mr. W. M. Calder, Clinical Clerk.

Fig. 398. Plug of mucous or coagulated blood, so placed that while it admits of partial expiration, it prevents inspiration and causes collapse of the pulmonary tissue, to which the smaller bronchi are distributed.—(*Gairdner.*)

rales were occasionally absent, but continued tolerably constant. The dry rales also underwent from time to time several variations in tone, intensity, and situation. During February, May, and June, he was tortured by severe and prolonged attacks of dyspnœa, during which he gasped for breath, and appeared on the point of suffocation. The attack generally terminated by violent cough, expectoration, and vomiting, after which he always felt relieved. These attacks came on every second or third night, and were sometimes occasioned by an unusually full meal. In May there was noticed, in addition to the other physical signs, a coarse moist tracheal rattle, so loud as to mask the pulmonary sounds. On one occasion, during this month, the attack of dyspnœa lasted four hours, producing partial asphyxia, delirium, and stupor. On the 24th of May, he was attacked with sore throat, and difficulty in deglutition, followed on the 30th by laryngitis and partial aphonia, which greatly aggravated the asthmatic attacks. During all this time, expectorants, antispasmodics, anodynes, counter-irritants, with occasional emetics, and cupping, were employed, with temporary, but no permanent benefit. In April and May the smoking of stramonium evidently afforded him considerable ease. He also experienced marked relief from a draught containing ʒiss each of Tr. Lobeliæ and of Æther. Towards the end of June, a sponge, saturated with a strong solution of nitrate of silver, was passed into the larynx several times, with marked benefit; indeed, so much so, that on the eleventh of July, his condition was greatly improved, the attacks of dyspnœa ceased, and the cough, expectoration, and other symptoms, were much abated. On the 16th, he was dismissed at his own request, to resume his occupation as cook on board ship. The sore throat and laryngitis had then disappeared, but the chest was still unusually resonant on percussion; there was loud tracheal breathing, prolonged expiration, and occasional sibilant rale. Respiration, however, was comparatively easy, and he considered himself, as he certainly was, greatly relieved.

Commentary.—This man presented all the physical signs and symptoms indicative of extensive emphysema dependent on chronic bronchitis, accompanied with the most severe asthmatic attacks. These attacks were of a spasmodic character, referable to irritation of the incident filaments of the pneumo-gastric nerve, and to reflex action by means of the excident ones, whereby the bronchial tubes were contracted, the glottis closed, and the muscles of inspiration rendered incapable of dilating the chest. Violent cough and vomiting were always induced towards the close of the attack, followed by relief. The dyspnœa during the course of the disease was alleviated by antispasmodics, and the laryngitis by topical applications, of which I have previously spoken. I consider, however, that his recovery was mainly due to the advance of summer and a change of temperature—circumstances which should never be overlooked in estimating the effects of treatment in such cases.

Of all the causes which excite asthmatic paroxysms in individuals labouring under emphysema, the effect of certain seasons and changes of temperature are the most unequivocal, and yet the most mysterious. Thus some persons who are martyrs to the disease in winter are perfectly well in summer, and *vice versa.* Some are immediately affected by the foggy air of London, and are well in the country; others are attacked when the wind blows from a particular quarter, especially the east. However difficult it may be to explain such idiosyncrasies, there can be no doubt that a knowledge of these circumstances will enable those who can change their residence to alleviate their sufferings in no small degree.

Emphysema is characterised anatomically by a permanent enlargement of the air-vesicles of the lung. These may frequently be seen through the pleura, with an ordinary lens, like groups of minute pearls. Two or more of them may break into each other, and produce others of larger dimensions, say, the size of a millet seed, and this process may go on, until, by the breaking down of the intervening partitions, every size of emphysematous cavity may be formed, up to that of a large orange. The walls of such cavities remain permanently open, having lost their elasticity. The tissues which form them also are evidently atrophied, and their paleness proves that the capillaries have been so compressed as to be either obliterated or impervious to the passage of blood.

In order to account for emphysema, numerous theories have been advanced, of which I shall allude to only the first and last. Laennec supposed that the fine bronchial tubes became rigid and more or less impervious from swelling of their lining membranes or impaction of mucus. He conceived that inspiration was a more powerful action than expiration, so that while air could be drawn through the obstructions, it could not be breathed out. In consequence, it accumulated in the ultimate pulmonary vesicles, became expanded by heat, and so acted mechanically as a dilator, distending them from within, and causing them to enlarge more and more according to the duration of the disease, and extent of the respiratory efforts. Dr. Gairdner, however, has pointed out that expiration is a much more powerful act than inspiration, and that there is never any difficulty in causing expulsion of air. It is the inspiration which is laborious in all bronchitic cases, and, as has been previously stated, when the tubes are obstructed, so far are the air-cells beyond them from being dilated that they are in truth collapsed. Emphysema, then, does not occur in the vesicles connected with obstructed tubes, but in those healthy ones which are adjacent. When the lungs are in a normal state, the column of air presses equally on all the tubes and vesicles, but when one portion connected with any obstruction is collapsed or otherwise diminished in bulk, then the neighbouring portion is over-expanded, so as to occupy the space previously filled by the former. Hence why emphysema occurs not only as a result of bronchitis, but of chronic phthisis, or any other disease which causes contraction and hypertrophy of the pulmonary fibrous tissue. This theory is certainly consistent with known facts, and may be therefore considered as not only probable, but as tolerably well established.

The treatment of chronic bronchitis must be directed to facilitate expectoration, by means of various expectorants, and to allay the irritability of the bronchial passages by means of anodynes. I have already alluded to the circumstance, that chronic pharyngitis, tonsillitis, elongation of the uvula, and follicular disease of the epiglottis, keeps up a cough, often mistaken for chronic bronchitis; and it is in these disorders that demulcents, lozenges of various kinds, astringent and stimulating gargles, etc., are found temporarily beneficial. In such cases the employment of the sponge, saturated in a solution of nitrate of silver, is, as we have seen in Case CXVII., of the greatest advantage. Perhaps there is no disease in which blisters and counter-irritations are more useful than in bronchitis.

When chronic bronchitis is associated with emphysema, and accompanied by spasmodic attacks of dyspnœa, the various kinds of antispasmodics are most serviceable. Sulphuric and chloric æther often act like magic ; and the smoking of stramonium, with or without opium, and other remedies of this class, though they seldom cure, procure great relief. The idiosyncrasy of the asthma should also be studied, and a change of temperature or locality advised, according to the peculiarities of the case.

CASE CXVIII.*—*Chronic Bronchitis—Emphysema—Injection of the Bronchi with a solution of Nitrate of Silver.*

HISTORY.—Eliza Dawson, æt. 24, a servant—admitted 27th May 1857. About fourteen months ago, after exposure to damp and cold, she was seized with a severe pain in the chest, accompanied by cough. The pain in the chest disappeared in a few days, but the cough persisted, though it was not very troublesome, till twelve months ago, when it again became very severe, the house in which she was living being damp. The pain in the chest at the same time returned. In the middle of last January, the pain and cough increased in severity, and were accompanied by considerable dyspnœa. She derived no benefit from treatment, and was only compelled to apply for admission, because her weakness was such as to prevent her continuing at work.

SYMPTOMS.—On percussion over the chest, resonance is very loud both anteriorly and posteriorly. On auscultation, expiration is everywhere prolonged. Sibilant and snoring sounds accompany inspiration and expiration on both sides, anteriorly and posteriorly. Vocal resonance everywhere diminished. Cough and dyspnœa paroxysmal; the respiration being laboured even in the intervals. Expectoration in moderate quantity, consisting of frothy fluid floating over tough gelatinous mucus. Apex of heart cannot be felt. Cardiac sounds normal, but masked by the pulmonary sounds. Pulse 74, of moderate strength. Tongue clean, but somewhat dry. Appetite impaired. Feels pain in the epigastrium after taking food. Bowels generally constipated, requiring the occasional use of aperients. Other functions normal. ℞ *Spirit. Æther. Nitric.* ʒiij ; *Spirit. Ammon. Aromatic.* ʒiv ; *Aquæ ad* ℥vi. *A table-spoonful to be taken thrice a day. The chest to be dry cupped anteriorly and posteriorly.*

PROGRESS OF THE CASE.—She has experienced great relief from the treatment, and on 1st June, the snoring sounds are reported to have disappeared. On that day, however, the dyspnœa again became distressing, and on 3d June, the sibilant and sonorous rales had returned. Was ordered *Spirit. Æther. Sulphuric.* ʒij; *Sol. Mur. Morph.* ʒiss; *Decoct. Senegæ ad* ℥vi. *A table-spoonful to be taken thrice a-day. A blister* 3 × 4 *to be applied over the chest.* This was followed by great relief; sibilus continued audible, but the sputum diminished in quantity, becoming altogether mucous. On the 13th, cough and dyspnœa again became severe, w pain in the chest. A blister 3 × 4 was again applied with benefit. 27*th June.*—The dyspnœa has returned during the last few days, the paroxysms occurring chiefly during the night. During the fit she sits up in bed; the whole chest heaves; the head is thrown back during inspiration; the face is unusually pale and moist with perspiration; lips pallid; articulation slow and measured; respiration accelerated with prolongation of expiration. *A drachm of sulphuric æther, and half a drachm of Sol. Mur. Morph. in a draught,* gave immediate relief. The fits now became less frequent, diminishing at the same time in severity and duration. On 13th July, after the previous application for a few days of the sponge to the throat, Dr. Bennett injected, by means of a catheter introduced into the trachea, ʒij of a solution containing half a drachm of nitrate of silver to ℥j of water. The operation was repeated next day. There was no return of dyspnœa till 15th July, when she had two paroxysms, both followed by vomiting. She had a third paroxysm next morning at 4 o'clock, which left her very weak, respiration at 2 P.M. being still considerably embarrassed. On 17th July, ʒij of the solution of nitrate of silver were again injected into the trachea. No difficulty is experienced in passing the tube, nor is any inconvenience felt by the patient. The presence of the catheter in the trachea was demonstrated by the propulsion of 2 or 3 drops from the external orifice to a distance of 3 feet during a forcible expiration. After the operation, she passed a much better night; the cough and expectoration being very much less and the respiration perfectly easy. On 22d July the operation was repeated; she vomited in an hour and a half after it, but remained comparatively free from cough and dyspnœa till 30th July, when a re-accession occurred. On 1st August, ʒij of the solution were again injected, and on 4th August, she left the Infirmary to obtain change of air.

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* Reported by Mr. Stephen Scott, Clinical Clerk.

Commentary.—This also was a case of chronic bronchitis, with emphysema and severe paroxysms of asthma, in which various remedies were tried with the effect of temporarily alleviating the dyspnœa. During her residence in the house, much of the bronchitis gradually disappeared, but the emphysema and asthma continued and underwent little change. It appeared to me a favourable opportunity for trying the new practice introduced by Dr. Horace Green of New York, of bronchial injections with a solution of nitrate of silver. We were singularly favoured in this case by the high position of the epiglottis, and the comparative insensibility of the larynx. The sponge saturated with the nitrate of silver solution, apparently caused no irritation whatever, and on passing the catheter through the rima glottidis little uneasiness was, manifested. Two drachms of a solution (ʒss of the salt to ℥j of water) were injected into the trachea several times, producing only a feeling of warmth in the chest, but, as she frequently declared, greatly diminishing the cough and expectoration from one to two days afterwards. This woman, with the catheter deep in the trachea, closed her mouth round the tube, respired through it, and could blow so as to render the expelled air quite sensible to the finger. No one could doubt that the tube was in the trachea, and that the solution had passed into the lungs. After her dismissal, I continued to see her, and subsequently increased both the strength and quantity of the injection. Latterly I have thrown in ℥ss, of the strength of ℈ij of the salt to ℥ of water.

On Injections of the Bronchi in Pulmonary Diseases.

In a publication which I received from Dr. Horace Green of New York in 1856, there is a table of 106 cases of pulmonary disease, which were treated by injections of the bronchi, with a solution of nitrate of silver. A flexible catheter was introduced through the larynx, into the right or left division of the trachea, and, by means of a glass syringe, the injection thrown into the lung. This bold proceeding was described as producing great benefit in cases of pulmonary tuberculosis, bronchitis, and asthma. Whilst tuberculosis is at first a constitutional disease, its localization in any part, reacts more or less on the general health; and the opinion I have long entertained, that any means which could enable the physician to act directly on the tissue of the lung or inflamed bronchi, would assist his efforts at cure—at once led me to take a favourable view of this new mode of treatment. The nitrate of silver ought to act as beneficially on the mucous membrane of the trachea and bronchi, as on that of any other hollow viscus, and we have seen previously that the remedy may be applied to the tracheal mucous membrane, by means of an artificial opening (see Case CXIII.), not only without injury but with decided benefit. The difficulty was obviously to get it there through the rima glottidis. I therefore wrote to Dr. Green, requesting him to send me the instruments he employed. In a letter which I received from him in reply, dated New York, January 30, 1857, he says:—

"I would, with much pleasure, send you the instruments I employ, but they are simple, and may be obtained at any surgical instrument maker's shop. They consist of an ordinary flexible or gum catheter, and a small silver or a glass syringe. The catheter is Hutching's gum-elastic catheter (Nos. 11 or 12), which is 12½ inches in length; and as the distance from the incisor teeth to the tracheal bifurcation is, ordinarily, in the adult, about eight inches, if this instrument is introduced so as to leave only two inches of the catheter projecting from the mouth, its lower extremity must of course (if it enter the trachea) reach into one or the other of its divisions. I first prepare my patients by making applications with the sponge-probang, for a period of one or two weeks, to the opening of the glottis and the larynx, until the sensibility of the parts is greatly diminished. Then, having the tube slightly bent, I dip the instrument in cold water (which serves to stiffen it for the moment, and obviates the necessity of using a wire), and with the patient's head thrown well back, and the tongue depressed, I place the bent extremity of the instrument on the laryngeal face of the epiglottis, and gliding it quickly through the rima glottidis, carry it down to or below the bifurcation, as the case may require. It is necessary that the patient continue to respire, and the instrument is most readily passed during the act of inspiration. The tube being introduced, the point of the syringe is inserted into its opening, and the solution injected. This latter part of the operation must be done as quickly as possible, or a spasm of the glottis is likely to occur. Indeed, if the natural sensibility of the aperture of the glottis is not well subdued by previous applications of the nitrate of silver solution, or if the tube in its introduction, touches roughly the border or lips of the glottis, a spasm of the glottis is certain to follow, which will arrest the further progress of the operation. The *epiglottis, which is nearly insensible*, (and this you may prove on any person, by thrusting two fingers over the base of the tongue, and touching, or even scratching with the nail, that cartilage), should be our guide in performing the operation. The strength of the solution for injecting is from 10 to 25 grains to the ounce of water. Commencing with 10 or 15 grains to the ounce, its strength is subsequently increased, and the amount I now employ is from $\frac{1}{2}$ to $1\frac{1}{2}$ drachms of this solution."

"In cases of bronchitis, asthma, and in phthisis, even the employment of the tube once or twice a week, diminishes the cough and expectorations with great certainty, especially in the two former diseases; and many cases have recovered under the local treatment after other means had failed. The applications of the sponge-probang are continued in the intervals of the employment of the tube."

My period of attendance on the clinical wards having expired in January, it was not until May 1857 that I had an opportunity of making a series of observations on this subject. I was then fortunately assisted by Professor Barker of New York, who showed me the kind of catheter he had seen Dr. Green employ, and demonstrated the manner in which the operation was performed. Without entering into minute particulars, I have only to say that I have confirmed the statements made by Dr. Horace Green. I have now introduced the catheter publicly in the clinical wards of the Royal Infirmary, in several patients affected with phthisis in various stages, in laryngitis and in chronic bronchitis, with severe paroxysms of asthma. In other cases in which I attempted to pass the tube, it was found to be impossible; in some because the epiglottis could not be fairly exposed, and in others on account of the irritability of the fauces, and too ready excitation of cough from pressure of the spatula. I have been surprised at the circumstance of the injections not being followed by the slightest irritation whatever, but rather by a pleasant feeling of warmth in the chest (some have experienced a sensation of coolness), followed by ease to the cough, and a check for a time to all expectoration.

In making these injections, I have observed very great differences in the form of the epiglottis, as well as in the irritability of the fauces and root of the tongue in different individuals. In some persons the epiglottis is easily exposed, and on depression of the tongue may be seen standing erect, quite insensible as stated by Dr. Green, so as easily to permit the passage of the catheter. In other cases, the top of the epiglottis can only be reached with the greatest difficulty, and in not a few is not to be seen at all. In such cases I have not as yet attempted to pass the catheter. Again, while some individuals can bear without difficulty forcible depression of the tongue, and considerable freedom in touching the fauces and rima glottidis, others are thrown easily into violent spasms, or exhibit great irritation in the parts, from the mere pressure of the spatula. This appears to me to be more constitutional than dependent on local disease; some persons being more irritable or easily excited than others, and I have observed the same difference in individuals who are in all respects perfectly well. On one occasion, I put the sponge through the rima, and allowed it to remain some seconds, completely obstructing respiration, but without causing cough or any other inconvenience. In the case of Dawson (Case CXVIII.), very trifling irritation was occasioned by the pressure of the catheter. Whenever great irritability exists, the operation cannot be performed.

Further experience of this new practice is required before its permanent good effects can be judged of, but my belief is, that, in appropriate cases, it will prove of great advantage.

PLEURITIS.

Case CXIX.*—*Acute Pleurisy—Recovery.*

History.—Mary Harvey, æt. 21, a robust servant girl, was admitted into the clinical ward July 23, 1851. She enjoyed good health until seven days ago, when, after unusual exposure to cold and wet, whilst washing clothes, she was seized with difficulty of breathing, and a sharp cutting pain in the right side. She shortly afterwards experienced headache, general soreness, and the usual symptoms of fever, but does not remember having had rigors. The dyspnœa and local pain have increased in intensity, although the febrile symptoms on admission had somewhat abated.

Symptoms on Admission.—On percussing the right lung anteriorly, there is complete dulness over its lower half, and, posteriorly, the dulness extends over the two lower thirds of the lung. On the left side, the lung is everywhere resonant on percussion. On listening over the dull portion of right side, there is complete absence of respiration, with loud pealing vocal resonance. In the centre of lung posteriorly œgophony. No friction or crepitating murmur can be distinguished. On the left side, respiration is puerile. Slight cough, but no expectoration; dyspnœa, but not urgent, and sharp cutting pain in right side, increased on taking a deep inspiration. Considerable headache and general soreness; the skin of natural temperature, but dry. Pulse 100, of natural strength; tongue furred; face flushed; no appetite; great thirst; functions of the body otherwise well performed.

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* Reported by Mr. C. D. F. Phillips, Clinical Clerk.

Progress of the Case.—On the following day the dyspnœa and pain had diminished. On the morning of the 25th there was considerable sweating, and next day a copious sediment of phosphates and lithates appeared in the urine, and it was observed that the febrile symptoms had disappeared. The pulse was 84, soft. On auscultation, a friction murmur could be heard at the upper margin of the dulness on the right side. On the 3d of August the pulse was 72, and weak. The pain still continued, and the physical signs were the same. On the 6th, the extent of the dulness, the œgophony, and vocal resonance, began to diminish, and the friction murmur to increase. On the 9th, no friction could be heard, and the respiratory murmurs were audible in the primarily dull portion of lung. On the 27th, with the exception of slight dulness, she was quite well, and was dismissed by her own desire. On admission, twelve leeches were applied to the affected side, followed by warm fomentations. Two purgative pills were administered, and a third of a grain of tartrate of antimony, with ʒss of solution of morphia, ordered to be taken every four hours. Subsequently a succession of blisters was applied to the right side. On the 3d of August she was ordered a pill of calomel and opium three times a-day. All the six prescribed were not taken, and no physiological action of the drug resulted.

Commentary.—This was a case of uncomplicated acute pleuritis, with all the characteristic symptoms and signs, as described by systematic authors. The fever terminated by crisis through the skin and kidneys, on the tenth day. The physical signs commenced to disappear on the seventeenth day, but had not wholly vanished until the thirty-fifth day. On admission, there must have been a considerable amount of exudation, with serum subsequently separated from it compressing the lung, so as to destroy the respiratory murmurs inferiorly. At the upper margin of the dulness, however, œgophony was heard, a sign as often absent as present in pleurisy, and certainly not deserving the importance which Laennec attached to it. The diminished action in the compressed lung was evidently counterbalanced by increased action in other portions of the pulmonary organs, as determined by the puerile respiration on the opposite side. Lastly, it was very instructive to observe how, as the fluid became absorbed, and the pleural surfaces were thereby allowed to come into contact, friction sounds were developed, and then ultimately disappeared, when union between these surfaces may be supposed to have taken place. The treatment slightly diminished the pain in the side, but in other respects evidently had no effect whatever on the progress of the disease.

Case CXX.*—*Acute Pleurisy without Functional Symptoms—Rapid Recovery.*

History.—Peter M'Guire, aged 21, labourer—admitted September 12th, 1856. States that in June last he was seized with pain in right side, hot skin, and slight fever, for which he was bled, blistered, and confined to bed for a fortnight. He perfectly recovered, but for the last five weeks he has been unable to carry on his usual employment in consequence of pains in his right shoulder, arm, and side. On Tuesday last (the 9th), these pains were unusually severe, accompanied, as he says, by dyspnœa, thirst, and heat of skin. On the following day (10th), although not confined to bed, he could not go to his work; and finding no improvement take place, he came to the hospital.

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* Reported by Mr. A. Turnbull, Clinical Clerk.

SYMPTOMS ON ADMISSION.—Percussion note over whole of the left side of thorax is resonant. Respiration is somewhat puerile. On the right side the lung is everywhere resonant on percussion, except posteriorly where there is slight dulness below the level of the angle of the scapula, and laterally, below the level of the sixth rib. On auscultation over the dull portion, respiration is faint, but there is no friction or crepitation to be heard. At the apex the respiration is harsh, and the vocal resonance is louder than on the other side. At the base near the spine there is an approach to œgophony. Cough slight, attended by little pain. Expectoration scanty and frothy. No pain in right side, nor uneasiness in taking a deep inspiration. Circulatory system normal, with the exception of the pulse, which is 96, full. Bowels constipated. Appetite bad. Considerable thirst. Urine clear; does not coagulate on being heated, nor on the addition of nitric acid. Chlorides abundant. ℞ *Pulv. Ipecac. Co.* gr. xii. *to be taken at bed-time.*

PROGRESS OF THE CASE.—*September 14th.*—Has not perspired much during the night. Complains of slight palpitation, but has no pain of any kind. Heart's sounds normal. On percussion over the right side of chest, the line of dulness, which in the recumbent position is at the fifth intercostal space, rises as high as the third when he sits up in bed. *15th.*—Line of dulness now extends up to the second rib anteriorly, and is the same in all positions. Vocal resonance above the nipple of right lung is loud, but breathing faint. At the apex, the expiration harsh and very much prolonged. Was ordered *one-twelfth of a grain of antimony every four hours. Had a blister applied last night, which has risen well. Sept. 17th.*—No pain in the side even on a deep inspiration. Has no fever; appetite good; expresses himself as much better. Pulse 100, small and weak. Dulness has become universal over the right side posteriorly, and anteriorly ascends to the second rib, above which a cracked-pot sound is audible. There is now no difference on percussion, when in the upright and when in the recumbent position. Respiratory murmurs posteriorly are feeble and distant, not healthy; œgophony well marked. On the left side posteriorly, expiration is puerile. Anteriorly on right side, respiration exaggerated superiorly, feeble inferiorly, and vocal resonance increased. No friction murmur anywhere audible. *Sept. 18th.*—Dulness has extended higher. Cracked-pot sound more limited, but increased in intensity under the clavicle. Posteriorly an occasional friction sound was detected; ordered to have this part painted with iodine. *Sept. 19th.*—Dulness now clearly limited by a line, the convexity of which is downwards, its greatest distance being from the clavicle one and a quarter inch, and its smallest distance one quarter of an inch. *Sept. 21st.*—Cracked-pot sound—now limited to a spot below the sterno-clavicular articulation—is not so audible. Complains of dyspnœa when walking. *Sept. 22d.*—Cracked-pot sound replaced by a somewhat metallic sound. Patient feels so much better, that he is anxious to leave the hospital to resume his labours. *23d.*—Very little expansion of right side of chest even on deep inspiration. A warm poultice to be applied over the whole right side of chest. *26th.*—Patient complains that after walking quickly he experienced dyspnœa. Hot spongio-piline to be applied to foment the whole side. *Patient takes three ounces of wine daily. 27th.*—The convex line of dulness anteriorly, which has for seven days been stationary at the line mentioned on the 19th, has now become lower, and not so clearly defined. No cough nor expectoration. Pulse 80 per minute, rather feeble. Appetite pretty good. Fomentations and wine continued. *October*

2*d.*—Resonance in front, and internal to the nipple, extends as far down as sixth intercostal space. Dulness to the right of the nipple still remains. The resonant portion at the anterior and upper part of right side may be bounded by a line drawn from the upper part of the axillary region to the nipple. Pulse gradually gaining strength. 4*th.*—The anterior portion of right side has almost entirely regained its normal resonance. Lateral region of same side is also increased in resonance. Anteriorly and laterally over fourth and fifth ribs, and posteriorly to a lesser degree, there is heard friction *de retour.* The palpitation has again returned, and on auscultation, a *very soft* murmur is heard with the first sound. 13*th.*—Percussion perfect over the whole of anterior surface of right side of thorax ; still a little dulness posteriorly. Friction *de retour* is only slightly marked during ordinary respiration. 18*th.*—Both sides of chest expand equally on deep inspiration. Anteriorly over both sides of chest, resonance equal. Laterally, external to nipple of right side, there is marked sense of resistance and slight diminution of tone on percussion when compared with opposite side. Posteriorly over whole of right side, percussion duller than over left, but still resonance is greatly increased to what previously existed. On auscultation posteriorly, respiratory murmurs equal on both sides ; no friction anywhere but on right side ; vocal resonance increased, especially laterally below the axilla. His general health has long been quite good, and he insisted on going out. Dismissed.

Commentary.—On the admission of this man, it was supposed, and I still think correctly, that the comparative dulness which existed on percussion over the right back depended on the pleurisy he had had in the previous June, and the wandering pains and slight fever were owing to rheumatism. Two days afterwards, fresh exudation was evidently poured into the right pleural cavity, and it is a remarkable fact that it continued to increase until the whole of that cavity was occupied, and this without fever, pain in the side, dyspnœa, or any of those symptoms which are thought the usual indications of acute pleurisy. In this state the exudation remained stationary for seven days, then began to be absorbed, and gradually disappeared. In short, we had the most distinct evidence from physical signs of the commencement, onward progress, and decline of an acute pleurisy, without any functional symptoms whatever, the man all the time maintaining he was in perfect health, and being with great difficulty retained in the house for the sake of observation. In this respect, the case proves that an acute pleurisy, like an acute pericarditis (Case LXXXII.), may be altogether latent, and at no period of its progress give rise to those symptoms with which systematic writers have made us so familiar. For another remarkable example of this fact, see Case CXXIII. It is unnecessary to comment in this place on the importance of such cases in reference to treatment, and to former views as to the good effects of blood-letting and antiphlogistic remedies. In the case of Stanbroke (Case LXXXIV.), we saw that a pericarditis required no such remedies to enable it to pass through its natural progress, and we have here another illustration of the same fact in reference to pleuritis. Local pain appears to be an accidental occurrence, and in no way essential to a true inflammation.

CASE CXXI.*—*Chronic Pleurisy on both sides—Bronchitis.*

HISTORY.—John O'Neill, æt. 40, a writer—admitted into the clinical ward November 28th, 1850. Three weeks before admission, he was suddenly seized with a severe pain in his left side, which impeded breathing. Three days afterwards feeling better, he returned to his employment, but in the evening he experienced distinct rigors, and the pain returned. Strong febrile symptoms followed, with cough and expectoration. He has been under medical treatment since then, and now, on admission, is considerably better.

SYMPTOMS ON ADMISSION.—On percussion, there is complete dulness over the whole of left side, anteriorly and posteriorly, with the exception of the infra-clavicular region, where the dulness is incomplete. Over the whole of right side there is unusual resonance. The expansion of the chest is greatly diminished on the left side, with absence of vocal fremitus. On auscultation, the respiratory murmurs are inaudible over left side, except at the apex, where there is prolonged expiration accompanied with sibilant rale. On the right side anteriorly, loud sibilant rales, both with inspiration and expiration. Posteriorly the respiratory murmurs are puerile. Increased vocal resonance, amounting to bronchophony, heard over whole of left side, assuming an œgophonic character over scapular region. On right side vocal resonance normal. Frequent and severe cough, followed by copious expectoration of frothy mucus. No pain in chest on taking a deep inspiration, but occasional "stitches" in left side. No dyspnœa. The apex of heart beats in the epigastrium, immediately below ensiform cartilage, and its sounds (which are healthy in character) are heard most distinctly on right side of sternum inferiorly. Pulse 68, small. Urine turbid, with deposit of lithates. Appetite good. Other systems normal.

PROGRESS OF THE CASE.—On the *9th of December* a friction sound was heard below the left clavicle, and the resonance on percussion was more diffused. On the 26*th*, loud friction sounds had extended from above on the left side down to an inch below the nipple, and dulness on percussion was confined to the two lower thirds of the lung. The bronchitis, also, was diminished, and on the 17*th of January* the cough and expectoration had ceased, and the bronchitic rales had disappeared. On the 23*d of February* a careful examination showed that there was complete dulness over left lung, from the nipple downwards, and that on auscultation there were loud double-friction sounds with absence of respiration. He now complained of dull pain on the right side of chest inferiorly, and on the following day there was heard in that situation a double-friction sound, which, however, disappeared on the *5th of March*. It returned every now and then, accompanied by "stitches" more or less severe. On the 2*d of April* there was dulness over both sides of chest, anteriorly from the nipple downwards, together with double-friction sounds on both sides. The expansion of both sides of chest is now equal—that on the left side having greatly increased, and the respiration being audible over its two superior thirds. During the whole of *April* the physical signs underwent no change, and he suffered considerably from dyspnœa. In *May* the dulness was more circumscribed on the left, and more extended on the right side. The dyspnœa, however, was diminished, and his general health so improved that he was enabled to take walks in the green. During the months of *June* and *July* he continued to improve, but complained of occasional pain in the chest, and cough, with slight expectoration, originating apparently from imprudent exposure to cold. The respiration, however, insensibly extended itself inferiorly on the left side, and towards the end of *July* the dulness was greatly diminished on the right side also. At this time he was so well that he was dismissed, *August* 4. The treatment consisted at first of expectorants and anodynes to mitigate the bronchitis, together with a course of the iodide of potassium, and frequent blisters applied to the pleuritic side. In *February*, pills of calomel and opium were ordered, which caused slight salivation for a period of ten days. On the appearance of pleurisy on the right side, it was combated by frequent applications of leeches, followed by counter-irritation. The latter remedy was continued from time to time during his subsequent residence in the house, together with occasional expectorants, anodynes, anti-spasmodics, and purgatives, according as his symptoms required them.

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* Reported by Messrs. Cunningham and Calder, Clinical Clerks.

Commentary.—In this case the disease ran a more chronic course, beginning on the left side, and subsequently attacking the right. As the one declined, the other increased, and in both the physical signs determined with great exactitude the extent of the fluid exudation, its subsequent absorption, the rubbing of the diseased surfaces against each other, and, lastly, their subsequent adhesion. These changes occupied a period of upwards of eight months. Seeing the slow progress of the case, and the indisposition the exudation exhibited to be absorbed, mercury was tried, and salivation maintained for ten days. At this time, such was the state of discomfort it produced, so thoroughly did it destroy the appetite and thereby diminish the vital powers, that it was discontinued. So far from causing absorption, the action of the drug not only failed to do so, but pleurisy on the opposite side actually developed itself while the system was under its influence. Surely facts of this kind ought to disabuse medical men of the notion, still very prevalent, of the power of this drug in causing absorption of an exudation. (See Pericarditis.)

Pathology, Diagnosis, and Treatment of Pleuritis.

The physical signs of pleurisy can scarcely be understood without an accurate acquaintance with the appearances which the exudation assumes on the pleural surface. This is essentially the same as has been previously described in the case of Pericarditis, p. 277.

In very acute cases of pleuritis, which have proved rapidly fatal, I have repeatedly observed the following appearances:—On elevating the sternum, care having been taken not to disturb the body for some hours, the pleural cavity on the side affected has been found full of an apparently clear fluid of a yellowish or greenish tint. On removing this by means of a small shallow cup, the first portions seem perfectly clear and transparent. On continuing to empty out the fluid, it has been observed that the deeper we descend the more turbid it becomes, until at length nothing but a semifluid mass is removed. It will frequently be found that large portions of this mass, although tolerably consistent, are semi-transparent, resembling a light-coloured calf's-foot jelly, whilst other portions present the usual opaque appearance. Sometimes, when the body has been undisturbed for twenty-four hours, the whole exudation is separated into two distinct portions,—the upper, fluid and perfectly transparent, whilst the lower is composed of a pultaceous mass, resembling a bread-and-water or oatmeal poultice. In all such cases, the fibrinous portions, from their superior specific gravity, have sunk to the bottom, whilst the supernatant serum remains clear. The semi-transparent lymph is the portion most recently exuded, in which very few of the plastic corpuscles formerly described, pp. 134, 135, have been developed.

When the progress of the exudation is less rapid, the coagulated fibrin or lymph assumes a more consistent appearance, and forms over the part inflamed, flocculi of different sizes, or a distinct lining, varying in thickness from half a line to an inch. This is always villous, but sometimes it presents a honey-combed appearance, or hangs in the serum in loose flakes of a dendritic character. A serous membrane, when inflamed, resembles a mucous surface, and, in point of fact, performs the functions of one for a time, and is very active in absorbing the serum. Occasionally also it assumes a lamellar arrangement, attributable probably to repeated exudations of blood-plasma at different times. This may be frequently observed on the pleura, and layer after layer may be readily dissected off. Sometimes there is more or less blood extravasated with the exudation, causing it to assume various tints of red, mahogany, purple, etc., according to the amount thrown out, and the period which has elapsed before examination.

When the inflammation has been less acute, or is of longer standing, we find, after death, that the coagulated blood-plasma or lymph has become more consistent. It assumes a more distinctly fibrous appearance, often extending between opposed serous surfaces in the form of bands, which have considerable tenacity and strength. These bands have a great disposition to contract, and ultimately become shorter and shorter, and assist in forming a dense substance, which at length firmly unites together the serous surfaces. This uniting substance becomes more and more dense, and not unfrequently resembles ligament in toughness and general aspect. In this form it may frequently be seen in phthisical cases, uniting together the lobes of the lung and pleural surfaces. Occasionally it assumes even a cartilaginous hardness, resembling the fibro-cartilage of the intervertebral substance. In this state it may frequently be observed on the pleuræ, and I have seen it thus half an inch thick, intimately uniting the lungs to the ribs. When it has been very slowly developed, it produces white indurated patches, of a glistening cartilaginous appearance, varying in extent, the surface of which has assumed the character of a serous membrane, and in no way interferes with the movements of neighbouring organs. Such patches are exceedingly common on the surface of parenchymatous organs, as the lungs, heart, liver, spleen, and kidneys. Lastly, false membranes on the pleural surfaces, but especially on the costal one, may assume a stony hardness, from the deposition of calcareous matter; and patches of this alteration may be scattered over the serous membrane, or may exist in disseminated points.

The minute structure of the coagulated exudation, composed of plastic or pyoid corpuscles and molecular fibres, has been previously described and figured, pp. 134, 135. These fibres are more and more aggregated together the more dense the lymph becomes, and, in cases of calcareous deposition, are associated with molecules and irregular masses of earthy salts, mingled with crystals of cholesterine, and, it may be, numerous fatty molecules and granules.

It results from our knowledge of the morbid anatomy of pleuritis, conjoined with careful observation at the bed-side, that, if a large quantity of fluid is interposed between the pleuræ, the respiratory murmurs will be lost, while the vocal resonance is increased. If the amount of fluid be small, the murmurs are obscure, and the vocal resonance assumes a peculiar vibrating character, said to resemble the bleating of a goat. This is *ægophony*. If strings or bands of chronic lymph exist, which are stretched during the movements of the chest, then the rubbing sound will assume a leathery or creaking character; and if there be calcareous deposition, a filing or grating noise may be produced, although this is very rarely heard over the pleuræ. Not unfrequently dense adhesions, with thickening of the fibrous tissue uniting the pleuræ, may occasion partial dulness, and increase of the vocal resonance, a result not uncommon at the apices of the lung, but which must be carefully distinguished from the condensation from tubercle.

With regard to the treatment, it is essentially the same as that of other acute inflammations. It is rare that a case enters an hospital in its incipient stage, that is, when the serous membrane is unusually dry, and before much exudation has occurred. But in private practice such cases are more common, and occasionally they may come on in the ward of an hospital. At this early period, a general bleeding was formerly recommended, with a view of cutting short the inflammation, the possibility of which we have discussed at p. 266. When, however, exudation has been poured out to any extent, and has coagulated, bleeding is injurious, and we must endeavour to favour the development, absorption, and excretion of the exudation, by means of warm topical applications, sudorifics, and diuretics. The urine especially should be carefully watched, as the sediments it contains will serve as an index to the amount of exuded matter excreted. Care should also be taken, at this period, not to allow the general strength to sink, for it is only by keeping up the nutritive functions that we can assist the vital powers in making those transformations which are essential in procuring the disappearance of the fluid, and adhesion of the solid exudation. By some, calomel is considered to be directly indicated as a means of favouring absorption from the serous cavity. It was fairly tried in Case CXXI., but was more productive of harm than of good; and although I have frequently seen the drug employed for this purpose, I have not met with a single instance where its good effects have been unequivocal. If there be much local pain, warm applications at first, and subsequently blisters, tend to remove it.

On some occasions, when the exudation has been very abundant in the pleural cavity, and the vital powers of the economy are constitutionally low, and have been depressed by injudicious antiphlogistic treatment or want of rest, the changes described do not occur. The exudation, in such cases, passes into pus, although some of the fibrous element attaches itself to and lines the membrane. This termination of pleuritis is denominated *empyema.*

CASE CXXII.*—*Empyema, with Fistulous Openings between the Lung and Pleural Cavity, and between the Pleural Cavity and External Surface.*

HISTORY.—George Fair, æt. 30, a ploughman—admitted December 10th, 1850, in a very exhausted state. Fourteen months ago had acute pleuritis, on account of which he was confined to bed for eight weeks, and was bled several times. Three months afterwards he still felt occasional pain in the right side, which gradually became more constant and severe, and at length was accompanied by cough and expectoration. He now perceived a small swelling below the right nipple, which, at the end of last July, was the size of a hen's egg. It was then opened by incision, and a quart of purulent matter extracted. About the end of August, two other apertures formed spontaneously in the neighbourhood of the previous one. As soon as matter was discharged from the external opening, the amount of expectoration was diminished.

SYMPTOMS ON ADMISSION.—Thoracic walls much depressed under right clavicle; right side of chest motionless on taking a full inspiration; three apertures still exist in the thoracic walls; the upper one (that made by the incision) is between the sixth and seventh ribs, immediately below the right nipple, the two others are a little lower down, and somewhat smaller; from all three there is a copious purulent discharge. Circumference of the thorax, on a level with the right nipple, measures thirty-five inches; from the spinous processes of the vertebræ to the sternum, on the right side, measures sixteen and a-half inches, and on the left, nineteen inches. On percussion, the left side is resonant throughout; on the right side there is dulness everywhere, but most marked in the inferior two-thirds; posteriorly, the dulness is not so marked as in front. On auscultation, the respiratory murmurs on the left side are puerile; under the right clavicle the respiratory murmurs are harsh, and the vocal resonance increased; a little lower down the respiratory murmurs become more feeble, and there is crepitation with the inspiration; in the remaining lower two-thirds of the right front, the respiratory sounds are inaudible; over the whole right back, the respiratory murmurs are feeble; the vocal resonance increased and œgophonic; in the lower third crepitation is audible. Pain over the sternum and under right clavicle; cough neither frequent nor severe; expectoration scanty, partly white and frothy, partly tenacious and muco-purulent. Apex of heart beats feebly half an inch to the left of its natural position. Pulse 92, slightly jerking, but compressible; general strength much reduced.

PROGRESS OF THE CASE.—In the beginning of *January*, he was attacked with vomiting and diarrhœa, accompanied with febrile symptoms, which greatly diminished his strength; his countenance assumed a hectic appearance, and the opening in the thorax became painful and larger, their margins were inflamed and ulcerating, and the discharge continued. On the 17*th*, it was ascertained, by means of the probe, that of the three openings the middle one alone enters directly into the pleural cavity, and admits with ease a No. 8 catheter; the other two communicate with the central one underneath the integument. On the *29th*, diarrhœa, and purulent discharge from the chest had diminished, his appetite and general health were also improved, but he was removed from the house by his friends. The treatment consisted at first of good diet and tonics; and, when the vomiting and diarrhœa appeared, various remedies to check these symptoms. On the *18th of January*, a small canula and No. 8 catheter were introduced side by side into the opening into the pleura. By means of a Read's syringe attached to the former, about a pint and a-half of distilled water, at the temperature of 90°, was injected into the pleural cavity. The fluid escaped through the flexible catheter, but did not equal in amount what was thrown in, and was at length discharged clear and unmixed with pus. During the half hour immediately following the operation, a quantity of clear water oozed from the wound.

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* Reported by Mr. J. M. Cunningham, Clinical Clerk.

Commentary.—When this man entered the house, his general strength was much reduced; and it was apparent, from a careful study of the physical signs and symptoms, that a communication existed between the lungs and pleural cavity, in addition to the external fistulous opening into the latter. The pleuro-pulmonary fistula had evidently formed before the opening through the thorax was made artificially, as evinced by the marked diminution of expectoration on the evacuation of pus externally. That it continued to exist, I was satisfied, by observing that the sputum was increased when the external discharge diminished, and *vice versa*. Two errors had been made in the previous treatment. These consisted,—1st, In the "frequent bleedings," which had very possibly so diminished the general powers of the system, as to have checked those changes in the exudation necessary for recovery; 2d, In making a free incision, instead of a small puncture to draw off the purulent matter. Of these two errors, the first, however, was the greatest; indeed it was irremediable. The second was probably undertaken with the idea formerly so prevalent, that pus is injurious to the economy, and when known to exist should be let out as soon and as freely as possible. We now know that there is nothing to be feared from the mere presence of pus, either in the lung or pleural cavity; and that the most natural method for its disappearance is by absorption and elimination. Still, when large in amount, and either pointing externally, or displacing the heart internally, no danger can arise by making a puncture with a small canula, as practised by Messrs. Cock and Syme, and sanctioned by Drs. Hughes and Alison. Indeed there is every chance of producing benefit, for we thereby save the vital powers a considerable amount of unnecessary work, and so facilitate the disappearance of the exudation and return of expansion in the compressed lung. With regard to the operation of paracentesis thoracis, and the good effects attending it, I refer you to the excellent papers of Dr. Hughes,* and the lecture of Dr. Alison.†

In the case before us, the difficulty experienced was to rally the general strength, especially after it had been so much reduced by diarrhœa, and this was to some extent accomplished. My attention was then directed to the cure of the thoracic disease; and it occurred to me that if the pus could be replaced by water, there would be less labour thrown upon the weakened absorbing surfaces. The pleural cavity, therefore, was washed out by distilled water, heated to 90° as directed; and this would have been repeated at intervals, had he not left the house, and thus put an end to every effort undertaken for his benefit.

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* Guy's Hospital Reports, vol. ii. Second Series.

† Monthly Journal, August 1850.

Case CXXIII.*—*Chronic Pleuritis and Pneumo-Thorax, without Symptoms—Articular Rheumatism—Pericarditis—Recovery.*

History.—William Dow, æt. 33, boot-maker—admitted 26th of January 1857. States that he has always been a temperate man up to his present illness, and has had pretty good health. On the 12th of last December, after exposure to cold and damp during the day, he was seized with articular pains, which affected most of the joints, and have continued to wander from one to the other up to the present time. On the evening of the 7th of January, independent of any exertion, the patient was suddenly seized with acute pain in the umbilical region, attended with difficulty of breathing; these symptoms were at once removed on taking a powder, which caused the expulsion of much wind. He denies ever having had cough, pain in the side, or any pulmonary symptoms whatever.

Symptoms on Admission.—On inspection of the chest, there is less expansion on the right than on the left side anteriorly; posteriorly, the right side bulges considerably below the level of the third rib; the measurement of the corresponding sides slightly varies; the girth of the left side is fifteen and a half, that of the right sixteen inches. The movement of inspiration on the right side is very slight; on the left the girth is increased half an inch on a full inspiration. Percussion note over the right side, anteriorly, is tympanitic from apex to base, being flatter at the apex. It likewise extends on a level with the nipple over the left side to about half an inch beyond the sternum. On auscultation, there is slight harshness of respiratory murmurs at the apex of left lung, the sounds of which are otherwise normal. On the right side, the vesicular murmur is supplanted by loud amphoric breathing, more distinct towards the base. Expiration is much prolonged. In the recumbent posture, both inspiration and expiration are accompanied by a clear prolonged metallic note, exactly like the distant blast of a trumpet, somewhat louder with expiration. Vocal resonance over the middle third is of a loud brazen metallic character. Posteriorly on this side, percussion superiorly is tympanitic, but below second dorsal spine, dulness commences, becoming more intense as it extends to the base of the lung. Laterally its extent is bounded by a line drawn vertically from the posterior fold of the axilla. At the apex, inspiration is blowing, with prolonged expiration, and at the close of inspiration a moist click is heard. Towards the base, the respiratory sounds are scarcely audible, and inspiration is accompanied with an obscure crepitation (?) Vocal resonance at apex and base is ægophonic, but over the middle third it is normal. No cough, expectoration, dyspnœa, pain, or other pulmonary symptom. Impulse of heart's apex felt in the usual position. Transverse dulness and sounds normal. Pulse 108, feeble. Patient is somewhat deaf; has still pain in both knee and ankle joints, and in the right shoulder and carpo-phalangeal joints. Tongue dry and furred, otherwise normal. Copious deposit of lithates in the urine. He is much emaciated, and for the last seven weeks has perspired very freely. *Habeat Pulv. Doveri* gr. xij *horâ somni sumenda.*

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* Reported by Mr. T. J. Walker, Clinical Clerk.

Progress of the Case.—*January 28th.*—Pain in the joints is now so much relieved, that he can move the limbs with comparative freedom. He slept well last night. ℞ *Potass Nitrat.*, *Potass Bicarb.* āā ʒij ; *Aquæ ad* ℥vj. *M. Capiat* ℥ss *ter indies. Jan. 29th.*—On examining the patient to-day, Dr. Bennett found that, while lying on his left side, percussion note was duller over the sternum than when he lay on his back, and the slightly dull tone over the right lateral region became clear. When also the patient is placed in a sitting or recumbent posture, dulness extends from the back forwards to the centre of the right lateral region, and upon being laid on his left side, the posterior part of the lateral region becomes resonant. *Jan. 31st.*—Physical signs over right side of chest continue as before. Apex of cardiac organ beats with a visible impulse somewhat to the inner side of a line, vertical from the nipple between the fifth and sixth ribs. At the margin of sternum a double rumbling sound is audible, not quite synchronous with the systolic or diastolic movements. Transverse dulness of heart on percussion still two inches. Pulse 100, small, rather hard. Respirations twenty-two. *Feb. 2d.*—Friction murmurs at the base of the cardiac organs more audible ; the patient has no pain over pericardium, nor uneasiness, except after cough, over the chest generally ; feels very slight tenderness on percussion over the sternum at the level of fifth and sixth ribs. *To have spongiopiline, saturated with warm water, applied over the præcordial region. Feb. 5th.*—Patient so well as to get up in the morning, and from this time he rapidly regained his strength. The pulmonary signs have undergone no change. The friction murmurs over the heart gradually diminished, and disappeared on the 12th, while a blowing murmur was gradually established, heard loudest with the first sound over the apex. He was dismissed March 11th.

June 22d.—He was re-admitted to-day, having in the interval again lost strength in consequence of his work being too fatiguing, and the appetite having failed him. The amphoric respiration, metallic notes, and brazen resonance of voice, have now disappeared from the right side, which is dull on percussion, immovable during inspiration, with slight trace of respiratory murmur, and great increase in the vocal resonance. Left lung healthy, with puerile respiration. Still a blowing murmur with the first sound of the heart, loudest at the apex. *To have nutrients, with* ℥iv *of wine daily. July 28th.*—Since last report his general health has been improving, and he now looks fat and well nourished, and says he is much stronger. Has no pain, cough, dyspnœa, or inconvenience of any kind. There is now decided flattening anteriorly over the upper third of the right chest. On deep inspiration it expands much more than formerly. It is still everywhere dull on percussion, with great increase of vocal resonance amounting to bronchophony anteriorly, and pectoriloquy posteriorly and superiorly. Respiratory murmurs are absent over upper third of lung, but inferiorly and anteriorly inspiration is audible but feeble, and posteriorly is much stronger. Discharged.

Commentary.—It is no uncommon thing for men who have previously had pleurisy, to be seen walking about the streets with one side of the chest more or less dull on percussion and incapable of action, although complaining of nothing. But this, so far as I am aware, is the only instance on record where a pleurisy has come on and proceeded to the formation of extensive pneumo-thorax, not only without symptoms, but without the cognizance of the patient. Yet such is the case before us. For when I demonstrated to the clinical class at the bed-side the tympanitic sound over the right chest on percussion, the absence of healthy respiration, the metallic notes with the respiratory murmurs, and the brazen amphoric vocal resonance, he himself denied that there was anything wrong with his chest, and smiled at the trouble we gave ourselves in examining it. In his case, as in Case CXX. after the acute rheumatism subsided, we had the greatest difficulty in keeping him in the house for the purpose of observation. On his going out, however, he himself at length became satisfied that his breathing was not so good as it ought to be, and on his re-admission subsequently, we had the pleasure, under the influence of nutrients, to see the morbid murmurs disappear, the chest gradually contract, and his general health re-establish itself. What might have been the consequence, if by means of physical signs we had not detected this morbid condition, but had dismissed him from the house as soon as he had recovered from his rheumatism, cannot positively be said; but judging from what followed, I have myself no doubt that he would rapidly have sunk exhausted. I saw him several times after his first dismissal, and he was only supported by the most energetic use of nutrients and wine.

CASE CXXIV.* — *Empyema, following Chronic Phthisis — Paracentesis Thoracis—Pneumo-Thorax—Singular mode of Death from Enormous Distension of the Stomach and Emphysema of its Coats—Tubercular Pleuritis — Adherent Pericardium — Waxy Spleen — Tubercle in the Kidneys.*

HISTORY.—Allan Brown, æt. 26, a gilder—admitted November 26. States that about twelve months ago, he suddenly, at night, experienced pain about the heart in drawing breath, together with shivering and febrile symptoms. For three days the pain was acute; it then disappeared, to come back however at different times, lasting for a day or two, and then disappearing again. During the six months preceding this attack, he had had a short, and, for the most part, a dry cough, with frothy, white, and gelatinous sputum. This has continued ever since; and on one occasion, eight months since, he spat up blood. Six months ago he noticed the left side enlarging; two months afterwards he became unfit for work, and also unable to lie in bed on the right side. About this period he was subject to profuse sweatings, which have since gradually declined. His appetite, at no time great, has become yet more defective, especially during the last few months. His thirst has always been considerable.

SYMPTOMS ON ADMISSION.—There is marked depression of the right chest under the clavicle. On the left side, there is a bulging in the mammary region outwards and forwards. Posteriorly there is a general protrusion of the left side of chest inferiorly, and fulness of the intercostal spaces, but to no great extent, except at the extreme base and over the lumbar region, where there is fluctuation and extreme tenderness on pressure with redness and increase of temperature. The chest measure—

	Level of Nipple.	Four inches lower.
Left side	18	17
Right side	18½	16½

This examination was conducted throughout while the patient was in the sitting posture. During respiration there is an expansive motion on the right side, especially under the clavicle and in the infra-axillary region, but on the left side there is no corresponding motion. There is also slight vocal fremitus on the right side, but none on the left. On percussion there is absolute dulness on the left side anteriorly, laterally, and posteriorly. On the right side anteriorly there is comparative resonance, but not loud nor clear, down to the level of the third rib. Below that level, over a region in which the cardiac pulsation may be felt, there is dulness. Laterally and posteriorly the percussion is good. On auscultation on the right side anteriorly down to the level of the third rib, also laterally and posteriorly, the respiratory murmurs are dry and somewhat blowing in character and intensified in tone. On the left side no respiration is audible, except near the sternal end of the clavicle anteriorly, and near the inferior angle of the scapula posteriorly. In these regions the respiratory murmur is heard faintly. Vocal resonance is greater over right apex, and posteriorly over the whole side, than over the corresponding left. There is great dyspnœa, so that the patient frequently cannot answer questions until he recovers breath. The cough is short, shallow, and gasping, and when excited continues for a considerable time, the patient's face becoming flushed. Sputum is scanty, and expectorated with difficulty. The cardiac impulse is between the fifth and sixth ribs on the right side, an inch and a-half below and to the outside of the right nipple. Cardiac sounds healthy. Pulse 130, small and weak. At this stage of the examination the patient became much troubled with spasmodic cough, so that further interrogation was considered unadvisable. *To have* ℥iij *of wine, steak diet, extra milk and an egg for breakfast.*

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* Reported by Mr. H. N. Maclaurin, Clinical Clerk.

Progress of the Case.—On the *8th* and *9th November* he was troubled with slight diarrhœa. On the *10th* he had slight rigors. At evening visit the following facts were elicited:—At the base of the right lateral region, strong fremitus corresponding to the respiratory rhythm may be felt on applying the hand. No particular pain exists in this spot except on pressure, and no dulness can be made out. Friction may be heard with inspiration and expiration as high as the lower third of the scapula posteriorly, laterally as high as the eighth rib, and anteriorly only at the base. Vocal fremitus unimpaired. Pulse 120; small, weak, and somewhat hard. *Nov. 11th.*—Friction was still audible; the pulse was 112, soft; the skin was cool; the diarrhœa stopped, or nearly so; the urine gave a large precipitate of lithates, and contained abundant chlorides. *Nov. 12th.*—The operation of paracentesis thoracis was performed by Mr. Syme in the following manner: A free incision was made in the lower part of the left back at the spot where the tumour was pointing. A considerable thickness of muscle had to be cut through, and the wound enlarged by means of the finger before any matter escaped. After this, about sixty ounces of dirty-yellow sanious pus were withdrawn, passing with force at each expiration. In the evening, forty ounces more of pus escaped. Breathing was easier than before the operation; cough not so readily excited; patient lies more on his back than before. Pulse 96, weak and soft. *Nov. 13th.*—Percussion is now tympanitic over the left side anteriorly; laterally and posteriorly, where the integument is œdematous, percussion gives great sense of resistance, with deep amphoric resonance. Vocal resonance posteriorly and anteriorly on the same side is amphoric, with whispering pectoriloquy. With inspiration under left clavicle, friction sound is audible; anteriorly, respiration is exceedingly faint; posteriorly there is tubular breathing, less distinct towards the base; close to the spine over upper two thirds of the lung, respiratory murmur is audible, but faint in comparison with the right side. On the right side, harsh inspiration and prolonged expiration continue to be heard, and vocal resonance is loud; friction murmurs have disappeared from the anterior and lateral regions. Cardiac apex beats two inches to the left and one inch below the right nipple. Pulse 108, soft and feeble. Tongue dry and bright red; appetite defective; occasional thirst; bowels regular. Great weakness, and considerable general uneasiness, but no local pain; occasional rigors. *Nov. 15th.*—At the left apex, and over left infra-mammary region, metallic tinkling was heard at the close of inspiration, and vocal resonance was loudly metallic in character. *Nov. 16th.*—The following measurements were taken at the same levels as those mentioned when he was admitted:—

	Level of Nipple.	Four inches lower.
Left side	$15\frac{3}{4}$	$15\frac{1}{2}$
Right side	$17\frac{1}{4}$	17

At this time, the pulse varied from 120 to 130; it was small and feeble. The patient complained much of the heat and fœtor of the discharge. Small granulations were seen on the edges of the wound. *Nov. 20th.*—The following report was made:—Three and a half inches below right nipple, rough friction sound with inspiration and expiration; five inches below, and two and a half inches to the outer side of right nipple, a rumbling friction with expiration; inspiration harsh and short, but otherwise free. One inch below, and four inches to the outer side of the same point, a finer friction sound with expiration alone. An inch and a half above same nipple respiratory murmurs are heard, intense in tone, accompanied during close of inspiration, and during expiration, with a sound superficial, and rough, resembling coarse crepitation. Two and a half inches above the same nipple, a mucous rale of the same character, coarse and dragging, accompanies inspiration only. Above this point, over the upper two ribs, the respiratory murmurs are harsh and loud. These observations were made while patient lay on his left side: his weakness precluded an examination of the back. His eyes are sunk; there is a cold clammy sweat on the face; occasional feeling of chilliness. *Nov. 26th.*—No change since last report. To-day his appetite has improved to such an extent that he was able to take two eggs for breakfast. Loud metallic tinkling still audible over the left chest. *Nov. 30th.*—Metallic tinkling is now no longer audible. *Dec. 4th.*—The following measurements were taken:—

	Level of Nipple.	Four inches lower.
Left side	15	15
Right side	16	$15\frac{1}{2}$

The second level was that of the ensiform cartilage. *Dec. 8th.*—A sore of the size of a fourpenny piece was observed over the sacrum, which caused the patient considerable pain. He continued to improve up to the 12th. His appetite increased; he slept well; no more rigors occurred, and his pulse fell to 96. *Dec. 13th.*—Last night about eleven o'clock he was seized with severe pain in the upper part of the abdomen, which prevented him from sleeping. This morning the pain still continues; it is increased by firm pressure, but he can easily bear slight pressure. Respiration is abdominal as well as thoracic. Appetite gone; bowels opened freely a few hours ago; dejections natural. Pulse 108, small, but not hard or strong. Skin hot; the look is not particularly anxious. *Dec. 15th.*—Three discoloured spots were found over the sacrum, with a very small ulcer, which, however, had a healthy granulating appearance. Continues to complain of abdominal pain. Yesterday, four loose stools were passed, which produced considerable uneasiness. To-day he has had but one stool; there is considerable tenderness on pressure, and distension from tympanitis over the whole left flank. Pulse 96, feeble, soft. *Dec. 16th.*—He was greatly relieved, and he continued in a comfortable condition till the 18th. On the evening of that day he was attacked by vomiting and a sensation of fulness in the abdomen, both of which he believed to be due to his having taken a quantity of lemonade. The vomiting continued till eleven P.M., when it ceased; the matters vomited were partly fluid and partly solid, and evidently consisted of alimentary substances. Tenderness on pressure in the region of the *recti* muscles; bowels opened this morning; dejections natural. Respirations 30, somewhat laboured. Pulse 120, small, somewhat hard, but quite compressible; consciousness perfect; skin hot and dry; cheek flushed. *Dec. 19th.*—A remission of the symptoms took place. On the 20th, vomiting recurred, together with abdominal pain and tenderness, as described in the report of the 18th. These continued to become severe till the morning of the 22d, when he sunk, with all the marks of great depression of the entire system. He died at 2 A.M. on the 22d.

From the moment of the patient's entering the hospital, every effort was made to sustain his strength by means of the most nourishing diet, together with wine. Diarrhœa was put a stop to by the use of cretaceous mixtures, and the rigors were successfully treated with quinine. The vomiting was diminished by bismuth and aromatic powder, and towards the end of the case he was greatly relieved by the use of brandy, and ice internally. Effervescing lemonade was allowed latterly to allay the patient's thirst.

Sectio Cadaveris.—Twenty-eight hours after death.

Body considerably emaciated. On reflecting the integuments, and removing the sternum and ribs anteriorly, so as to expose the thoracic and abdominal cavities, the contained viscera were observed to be displaced as follows:—The left thoracic cavity presented an empty space, in consequence of the lung being compressed and tightly bound down to the spinal column. Fig. 399, *b*. The heart was in the centre of the body, passing somewhat to the right side. The stomach was enormously dilated, extending to the pubes, and concealing all the abdominal viscera, except a portion of the right lobe of the liver and colon. Fig. 399, *e*.

THORAX.—On opening the thorax, there was an escape of fœtid air from the left side. The pericardium was everywhere strongly adherent. The heart and its valves healthy, weighing, with pericardium, 8½ oz. The left pleural cavity contained about 6 oz. of dirty fœtid purulent fluid. The surfaces of the pleuræ, parietal and visceral, were covered with a layer of chronic lymph, having scattered throughout its substance opaque yellow spots of the size of millet seeds, resembling tubercle. This layer of lymph could readily be scraped off, and was seen to be about one-eighth of an inch in thickness, having a soft pulpy layer internally, and where attached externally to be highly vascular. The lung was bound down to the

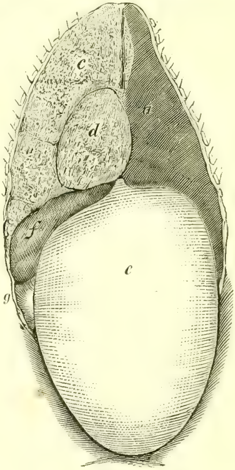

Fig. 399.

Fig. 399. Relative position of the thoracic and abdominal viscera, on reflecting the integuments in Allan Brown's case. *a*, Empty left thoracic cavity; *b*, left lung; *c*, right lung; *d*, heart; *e*, enormously distended stomach; *f*, liver; *g*, colon.

spinal column by firm and dense adhesions. Its tissue was compressed and carnified, and its size reduced to a spindle-shaped body about five inches long, and two inches in its greatest diameter. Fig. 399, *b*. On insufflation it expanded very imperfectly. At the apex there was a cavity the size of a walnut, having a distinct lining membrane, and filled with soft, cheesy, tubercular matter, evidently of old standing. Scattered through the substance of the lung were numerous small masses of tubercles, but no other cavities. The right lung was universally adherent by dense chronic adhesions. It was moderately voluminous, and at the apex were numerous stellate puckerings, corresponding to dense fibrous cicatrices in the substance of the pulmonary tissue, but without concretions.

ABDOMEN.—The stomach was enormously dilated as formerly described. Fig. 399, *e*. On opening it, it was found to be distended with air, and somewhat twisted round on itself at the junction of the cardia and œsophagus. All the coats were very thin, apparently from the distension. The mucous coat was healthy, and no abrasions could be discovered in it. But between the serous and muscular, as well as the muscular and mucous coats, numerous bullæ of air were visible, which could be moved about by pressure of the fingers, evidently dependent on the existence of some gas in the texture, which was in no way putrid, nor was the gas itself of fœtid odour. In the cœcum and ascending colon were numerous small depressions in the mucous coat, the cicatrices of former ulcers. There was nowhere any trace of recent intestinal ulcerations. The spleen weighed 8 oz.; sp. gr. 1063. Its pulp was healthy, but the malpighian bodies were enlarged throughout, and resembled grains of boiled sago. The kidneys were pale, and had two or three small masses of tubercle imbedded in the cortical substance. Liver and other organs healthy.

Commentary.—The place for making an opening into the thoracic cavity in empyema should always be chosen with the greatest care. The general rule is, that if the pus causes a prominent tumour, to puncture there, but if not, then one of the intercostal spaces between the fifth and seventh ribs should be chosen, but so as to avoid the heart and diaphragm. In the above case, with bulging of the thoracic walls inferiorly and posteriorly, the opening was made at the most prominent part by a large incision, and the offensive matter it contained replaced by air. This proceeding, which converts an empyema at once into pneumo-thorax, it is argued, can have no ill effect, so long as the aperture remains free, and the air thereby prevented from becoming fœtid. The operation was had recourse to more as a palliative than as a curative proceeding in the present case, the phthisical complication rendering ultimate recovery very improbable. My impression, however, is, that under more favourable circumstances, the small puncture, avoiding admission of air as much as possible, holds out the best prospect of success.

The mode of death in this case was very remarkable, and indeed, so far as I am aware, unique. The man to relieve his thirst was allowed two or three bottles of effervescing lemonade as drink during the day. It would appear, that on the 15th of December he complained of fulness of the stomach, and tympanitic distension of the abdomen, which symptoms, however, excited no great attention, although they may have originated in the same cause, which apparently produced the more violent complaints that came on subsequently. On the evening of the 18th he was seized suddenly with all the symptoms of perforation of the bowel, and on examining him next day, such was what I believed to have occurred. There was great abdominal tympanitic swelling, excessive pain, vomiting, etc. But on dissection we found that these symptoms depended on great distension of the stomach, with emphysema of its coats, the latter a lesion, which I believe was then observed for the first time. It was not caused by putrefaction ; and the question arose, How was it produced ? It turned out on inquiry from the nurse and neighbouring patients, that the man had kept his bottles of effervescing lemonade till the evening, and drank at least the contents of two of them in quick succession. It is probable, therefore, that the extrication of gas had distended the stomach, and caused it to twist round partly on itself at the cardia, so as to prevent its escape. Hence the distension and pain, and how probably the contained air, not finding a ready exit in consequence through either the cardia or pylorus, had forced its way between the coats of the organ itself.

With regard to the other facts of this case, they present in a well marked form all the characteristic phenomena, first of empyema of the left side, and secondly, of pneumo-thorax. A disquisition on these two thoracic diseases, their diagnosis and treatment, would lead me too far. There is only one point to which I think it necessary to refer, namely, the cause of metallic tinkling ; and I do so merely to say that notwithstanding the ingenious theories which have been advanced to account for it, they all appear to me faulty. I have satisfied myself that the breaking of bubbles of air on the surface of fluid, or the splashing of water in a cavity containing air, will not *always* explain the occurrence. On one occasion I heard metallic tinkling most distinct over the lung in a man dying of phthisis. After death I commenced the examination by making an opening between the ribs cautiously, over the centre of the tympanitic space, thinking that air would escape. But the pleuræ were universally adherent. There was no cavity whatever, but simply hard nodules of tubercle, scattered throughout a highly emphysematous lung.

PNEUMONIA.

CASE CXXV.*—*Pneumonia on Right Side and Slight Pleuritis—Recovery.*

HISTORY.—Roderick M'Farlane, æt. 20, a gardener of healthy and robust constitution—admitted December 17th, 1856. On the 12th instant felt unwell, with a sensation of cold in the back. On the 13th had pain in the right infra-axillary region, increased on deep inspiration, with hot skin, headache, thirst, and loss of appetite, symptoms which have continued ever since. On the 14th, cough appeared with scanty expectoration. Has taken a dose of castor-oil and some pills.

SYMPTOMS ON ADMISSION.—Expansion on both sides of chest equal. Respirations twenty-four in the minute, not laboured. Can lie on either side, but prefers lying on the back. Pain during deep inspiration over right infra-axillary region ; slight cough ; scanty expectoration—frothy and mucous. On percussion, cracked-pot resonance extends from clavicle to fifth rib on right side. Below this level, percussion is dull. There is also decided dulness posteriorly from spine of scapula to base. Elsewhere percussion natural. On auscultation, puerile respiration over left front ; over right front superiorly respiration is harsh, without rale ; below fifth rib, it is suppressed. Posteriorly over two lower thirds, double friction is audible, with fine crepitation at the close of inspiration : on left side occasional sibilus, with a few moist rattles at close of inspiration over lower third. The vocal resonance is increased and sharp on right side anteriorly, but greatly increased and œgophonic posteriorly over area of dulness. Pulse 104, incompressible and full. Skin hot and dry. Tongue in centre brown, dry, and cracked ; edges moist and clean. No appetite ; great thirst ; bowels always regular, but have been opened by laxatives. Urine natural. Other functions normal. ℞ *Sol. Antim. Tart.*, ℥ss ; *Aquæ Ammon. Acet.* ʒj ; *Aquæ* ℥viss. *M. Habeat sextam partem quartâ quâque horâ.*

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* Reported by Dr. J. Glen, Resident Clinical Physician.

Progress of the Case.—*December 18th.*—Grazing friction audible over the right infra-mammary region. Crepitation distinct over right back inferiorly. Pulse 120, soft. Sputum scanty, consisting of orange-coloured, gelatinous masses. Otherwise the same. *Dec. 20th.*—Crepitations very coarse over right back. Fever abated. Tongue moist and clean. Pulse 72, of good strength. Temperature of skin natural. *Omitt. mist.* *Dec. 22d.*—Crepitation and friction disappeared from right back. Abundant sediment of lithates in the urine. ℞ *Sp. Æther. Nit.*, ʒiij ; *Vin. Sem. Colchici,* ʒj ; *Aquæ ad* ℥vj. *M. Two table-spoonfuls to be taken every four hours.* *Dec. 24th.*—Dulness over right back and cracked-pot sound anteriorly greatly diminished. For the last three days has had profuse diaphoresis. Urine again natural. *Omitt. mist.* To have steak diet. *Dec. 26th.*—No dulness anywhere ; respirations natural. Is quite recovered ; but as the weather was severe, and he had to work immediately in the open air, if dismissed, he was not discharged until January 2d.

Commentary.—This young man was first seized with illness on the 12th of December, and was admitted on the 17th, when hepatization of the lung was found to have occurred in the lower two-thirds of the organ on the right side, combined with slight pleuritis. Fever was well marked, the pulse full and incompressible. On the 22d, the exudation was thoroughly softened and passing off from the economy principally by the urine, but partly by the skin. On the 26th, all trace of the disease had disappeared. The treatment consisted at first of slight salines and rest, then of a diuretic mixture to favour excretion of the effete products by the urine, and lastly of steak diet. From the first commencement to the complete disappearance of the disease was fourteen days ; and to the abatement of fever and commencing resolution, eight days. The febrile phenomena in this case were unusually well pronounced. The pulse was full and incompressible—in fact hard ; the skin hot and dry. Tongue furred and dry ; no appetite ; great thirst, etc. In short, this young vigorous lad presented all those symptoms in which we are instructed by most writers to bleed, and in which it has been argued, that without bleeding a fatal suppuration was likely to occur. I need scarcely add, that the propriety of such practice, as well as the probable fatality, were alike negatived by the result.

Case CXXVI.*—*Double Pneumonia—Recovery.*

History.—Peter Robertson, æt. 51, a tolerably robust man, house-painter—admitted May 11, 1857. On Tuesday last, the 5th instant, when washing the outside of a house, he got wet through from the dripping of water. In the evening had a rigor, which continued more or less all night. On the following morning had a short cough, and a thick yellow sputum. These symptoms continued the two following days with pain in the left breast anteriorly; but he continued at his work, feeling very weak. On the 9th he was obliged to go to bed, and observed his sputum to be tinged with blood. Yesterday again had rigors, with cramps in the arms and elbows.

Symptoms on Admission.—On percussion there is marked dulness over the lower two-thirds of the left lung posteriorly, with tubular breathing and coarse mucous rale on inspiration. The vocal resonance is œgophonic inferiorly, and bronchophonic over the middle third. Right side and anterior surfaces normal. Sputum copious and viscid, mixed with dark blood. Pulse 100, small and weak. Respirations 36 per minute. Skin moist. Other functions normal. ℞ *Liq. Ammon. Acet.* ℥j; *Sp. Æther Nitric.* ʒss; *Vin. Antim.* ʒiss; *Aquæ ad* ℥vj. *M. One table-spoonful to be taken every three hours.*

Progress of the Case.—*May 12th.*—Dulness on percussion over lower third of right back, in addition to that on the left, with tubular breathing and increased vocal resonance. Physical signs otherwise the same. Respirations are 40 in the minute, laborious and catching. Sputum gelatinous and rusty. Pulse 120, weak. Face livid, and expressive of great anxiety. Urine high coloured, scanty, and deficient in chlorides. *Warm fomentations to be applied over left side, and to have* ʒiv *of wine. May 13th.*—Much better. Respiration easy. No lividity or anxiety of countenance. Cough diminished. Pulse 80, soft, but of good strength. *Omitt. mist. May 14th.*—Less dulness and crepitation on left side; on right side crepitation fully established. Chlorides present to a slight degree in urine, and urates abundant. Pulse 74, regular. Appetite returning. Tongue clean. *May 16th.*—Is now convalescent. Urine natural. Percussion resonant over both backs; inspiratory murmurs harsh, but no moist rales. Cough painless. Still gelatinous sputum without blood. Has been out of bed, and feels tolerably strong. *Steak diet. May 19th.*—Has been up all day, and says he is quite well. *May 20th.*—Dismissed.

Commentary.—This was a severe case of double pneumonia, with great dyspnœa, impending suffocation, and great weakness on the seventh day, when wine was liberally administered. On the following day he was better and continued to improve, so that on the eleventh day he was fully convalescent, and on the fourteenth was quite well, and returned to his work. I never saw a case in which the symptoms were more urgent than in this man the day after his admission, and in which the livid and anxious countenance, the intense dyspnœa, the bloody sputum and feeble pulse, gave stronger evidence of impending dissolution. I am satisfied that a bleeding, however small, at this juncture, would have produced death rapidly, a practice which formerly I have too often seen carried out as a mere matter of routine. Under an opposite treatment of warm fomentations locally, and wine, these symptoms quickly subsided, and next day he was found breathing easily, and from that moment, though both lungs were affected, speedily recovered.

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* Reported by Mr. W. H. Davies, Clinical Clerk.

CASE CXXVII.*—*Pneumonia on the Right Side—Early Bleeding—Slow Recovery.*

HISTORY.—James M'Quair, tailor, æt. 19—admitted June 4th, 1855. This man has been of intemperate habits during the last five years. On the 28th of May, after severe drinking and exertion, followed by exposure to the night air, he was attacked early in the morning with rigor, chilliness, a feeling of weight over his whole body, and a dull heavy pain in the right chest. He drank several glasses of whisky and water to allay his thirst, and kept his bed, occasionally vomiting, and going out of doors to stool, until the 30th. He now felt very feverish, weak, and unwell, and a soup-plateful of blood was extracted from the arm. (℥xxiv.) Venesection to the same amount was made on the following day; but the pains in the side, with sanguineous cough and expectoration continuing, he came to the Infirmary.

SYMPTOMS ON ADMISSION.—On admission, the patient has an anxious and flushed appearance, and feels very weak. The respiration is hurried, 42 in a minute, and the lower part of the right lung expands little. Cough is short, frequent, and suppressed; the expectoration scanty, consisting of gelatinous mucus, slightly tinged with blood. On percussion, there is marked comparative dulness over the inferior half of the right lung, but the upper half anteriorly, especially at the apex, though flat in tone, gives out a tympanitic and somewhat intestinal note. On auscultation, crepitation is audible all over the right lung, both anteriorly and posteriorly, and the vocal resonance is much increased over the dull portion. The left lung is normal. The pulse is 100, hard and incompressible. Heart normal. Tongue dry, and covered with a dark brown fur, and the teeth surrounded by sordes. Appetite gone; great thirst; the vomiting, which existed at the commencement of the attack, has now ceased. Abdominal viscera normal; bowels regular. Skin dry and hot to the feel. Urine high-coloured and diminished in quantity, clear and without sediment. No trace of chlorides; no albumen. Nervous system normal. ℞ *Antim. Tart.* gr. iij; *Aquæ*, ℥vj; *Solve.* ℥j *to be taken every three hours.*

PROGRESS OF THE CASE.—*June 5th.*—Says he feels better; pulse 90, full and compressible, but in the evening it fell to 80, and became soft. *June 6th.*—Pulse 78, soft, breathing more easy. On percussion, the lower half of right lung is dull, but the upper half is resonant, with distinct cracked-pot sound. Fine crepitation audible over the whole of right chest. *June 8th.*—The whole of the right lung in front has become resonant on percussion; otherwise the same. Faint trace of chlorides in the urine. *June 9th.*—Chlorides abundant in the urine. *June 10th.*—Percussion resonant and equal over both sides of chest anteriorly. Under right clavicle, cracked-pot sound still audible. Crepitation much less inferiorly, but continues at the apex, with increase of vocal resonance. Posteriorly, percussion over right lung dull inferiorly, with loud crepitation and œgophonic resonance of voice. The patient feels much better, though weak. Respiration free. Pulse 72, soft and regular. Considerable diaphoresis. Urine deposits on cooling a large amount of lithates. ℞ *Antim. Tart.* gr. ij; *Tinct. Camph. co.* ʒij; *Decoct. Serpent.* ℥xij. *M.* ℥j *to be taken every three hours. June 14th.*—Physical signs of right lung, with the exception of cracked-pot sound, much diminished. Has been taking, during the last three days, good diet, with ℥iv of wine. From this time he improved slowly, the crepitation and dulness posteriorly gradually disappeared, but the cracked-pot sound continued with great intensity up to the 29th of June. His strength was not sufficient to admit of his discharge until the 3d of July.

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* Reported by Mr. Robert Byers, Clinical Clerk.

Commentary.—This was a case in which nearly the whole of the right lung became pneumonic, and where we had an opportunity of convincing ourselves that full and repeated bleeding, although practised so early as the second and third days, had no beneficial influence on the progress of the disease. It should also be remarked, that these bleedings were practised in accordance with the rules laid down in systematic writings, that is to say, not only early, but when the pulse was accelerated, hard, and incompressible, with all the characteristic symptoms of the disease. Surely, if bleedings could cut short or diminish the duration of a pneumonia, it might have been expected in this case. Yet so far from proving beneficial, they appear to me to have assisted in prolonging the case, and preventing resolution and recovery. For although the critical diaphoresis, and discharge of lithates by urine, occurred on the fourteenth day, the subsequent weakness was considerable.

On his admission into the house, the eighth day of the disease, the chlorides were observed to be absent from the urine. This fluid was tested daily for these salts, which returned in small quantity on the twelfth, and were abundant on the thirteenth day of the disease. If, as we shall subsequently see, it is probable their reappearance indicates a cessation of fresh exudation, then it was observable that on the day following, excretion of the morbid products commenced by the skin and kidneys. The interval between the return of chlorides to the urine and the critical period, varies considerably in different cases; but the careful estimate of these facts in future will, I think, furnish us with valuable hints as to the vital power of the exudation. If, for instance, it should ultimately be shown that the return of chlorides indicated stoppage of exudation, and the presence of lithates or other critical discharge, the commencement of excretion of the exudation, then we shall possess evidence not previously discovered, as to when the pathological lesion is checked, and when the reparative changes in the economy commence.

Another fact, which excited considerable attention in this case, was the characteristic cracked-pot sound under the right clavicle. The physical signs sufficiently proved that the pneumonic condensation commenced at the base of the lung, and proceeded upwards, where, posteriorly and anteriorly, a considerable amount of air was retained in the air vesicles, so that percussion was never dull, although crepitation and increased vocal resonance existed. This presence of condensed lung, covered with or surrounded by air, or a cavity containing air, surrounded by condensed tissue, seems to constitute the conditions from which this peculiar noise is elicited when the mouth is open. Hence the occurrence of the cracked-pot sound (*bruit de pot felé*) is common in pneumonia and in a variety of diseases which present similar physical conditions.

CASE CXXVIII.*—*Erysipelas of the Face followed by Pneumonia of the Right Side—Recovery.*

HISTORY.—Margaret Armstrong, æt. 28, wife of a shoemaker, of robust healthy appearance,—admitted December 7, 1855. She states that she was quite well up to Wednesday evening last (December 5th), when, after being engaged for some time in washing, she was seized with rigors and febrile symptoms. Next morning her face felt painful and swollen, and has continued so up to the time of admission. When examined in the ward, the whole of the face and forehead was of a fiery red colour, the integuments, and especially the eyelids, greatly swollen, with a few bullæ on each cheek, full of yellow lymph; the skin everywhere hot, and in the face giving rise to a severe smarting sensation. Tongue and lips dry, covered with black sordes; great thirst; no appetite; cephalalgia; pulse 130, soft; bowels not open. Urine natural in quantity, turbid from pinkish sediment, containing a considerable amount of albumen, and a very scanty quantity of chlorides. *To have* ℥ss *of castor oil, and the face to be covered with cloths rung out of warm water.*

PROGRESS OF THE CASE.—*December 11th.*—To-day the face is assuming its natural colour, the epidermis desquamating. There is no albumen in the urine, and the chlorides are abundant. *Dec. 13th.*—The erysipelas has now disappeared, but there is a general aspect of prostration. She has had a short cough for the last two days, which cannot be ascertained to have been ushered in by rigors. Breathing hurried and laborious. Pulse 92, small. On percussing the chest posteriorly, there is comparative dulness over right back inferiorly. On auscultation, a fine crepitation is audible there on inspiration, with sonorous and sibilant rales and increased resonance (almost pealing) of the voice. Dry rales are also heard anteriorly on this side, causing deep inspiration, with coarse moist rale. There is no expectoration. Urine abundant, of brick dust colour, which disappears on the addition of heat; sp. gr. 1022, no albumen, and the chlorides have disappeared. *To have beef tea, and* ℥vj *of wine daily. Dec. 17th.*—The pneumonia, since last report, has produced complete dulness, with bronchophony in the lower third of right lung, which is, however, now disappearing. To-day, chlorides in urine are more abundant. *Dec. 19th.*—Diseased lung more resonant on percussion. Breathing more natural, free from moist rale. Still increase of vocal resonance. Chlorides abundant in urine. *Diminish wine to* ℥iij *daily. Dec. 24th.*—To-day can breath without difficulty; respiration on right side normal, but still some increase of vocal resonance; pulse 66, of good strength. Expresses herself as being quite well. Has been for the last two days on good diet, and walking about the ward. Wishes to leave the hospital. Dismissed.

Commentary.—The erysipelas in this case was very severe, but occurring, as it did, in a healthy young woman, gave us little concern, and was allowed to take its natural course. Warm water

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[*] Reported by Mr. G. Robertson, Clinical Clerk.

applications only were employed to relieve the smarting. The disease, in consequence, had disappeared by the seventh day. The chlorides in the urine were diminished during the accession of the fever and presence of the eruption, and returned abundantly when the erysipelas had disappeared. The ward at this time was very cold, from some of the ventilators, which allowed the admission of frosty air, not having been closed. Pneumonia on one side came on, and the chlorides again disappeared from the urine. The attack supervening on an acute febrile disease was characterised by great prostration of the system and weak pulse throughout. But, under the careful exhibition of nutrients and six ounces of wine daily, she made a rapid recovery. The pneumonia was detected on the 13th. The chlorides had returned on the 19th, and she was dismissed at her own request, quite well, on the 24th. The pneumonia was only of seven days' duration, up to the time of commencing resolution.

CASE CXXIX.*—*Double Pneumonia—Treatment by Mercury, which caused Profuse Salivation before Admission—Prolonged Recovery.*

HISTORY.—Robert Jude, æt. 36, a bricklayer—admitted 10th December 1855. On the 1st instant, when engaged building bricks round a boiler, the weather being very cold and windy, he suddenly felt a pain in the chest, deep-seated, half way between the ensiform cartilage and umbilicus. The pain rapidly grew worse, and caused nausea, but he could not vomit. He immediately went home, took some gruel, and went to bed. On the 4th, a medical man gave him some pills, one of which he took every third hour. On the 6th his teeth were loose, the gums very tender, and the tongue swollen to twice its natural size, so that he could not spit out the excessive amount of saliva that was secreted, and which consequently flowed from his mouth. He also had pain in the loins.

SYMPTOMS ON ADMISSION.—On admission, the excessive salivation has much diminished, but there is still tenderness and redness of the gums, with considerable discharge from the mouth. The breath fœtid, the tongue covered with a dense, dirty white coating. The bowels, while taking the pills, were open from six to seven times a day ; they are now regular. His diet has been confined to farinaceous articles. On percussing the chest anteriorly, it is everywhere resonant, but posteriorly it is dull on both sides, most so on left side. On auscultation anteriorly nothing abnormal, but posteriorly respiratory murmurs are harsh and shrill, with occasional sibilation. At the base on right side, there is crepitation on inspiration ; on the left side respiration is tubular. Vocal resonance equal superiorly and anteriorly, but posteriorly everywhere increased, on the left side amounting to bronchophony. Pulse 96, weak ; heart sounds normal ; skin hot, moderately dry, but there has been profuse perspiration ; there is dull pain in lumbar regions ; urine opaque from the existence of a reddish cloud ; sp. gr. 1024, not coagulable, but clears on the addition of heat ; chlorides diminished in quantity. ℞ *Sp. Æther. Nit.* ʒiij ; *Potass. Acetat.* ʒij ; *Aquæ ad.* ℥vj. *M. One table-spoonful to be taken every four hours.* ℞. *Liquor. Sodæ Chlor.* ℥j ; *Sp. Vini Gallic.* ℥ss ; *Infus. Rosar. c. ad.* ℥vj. *M. ft. Gargarisma.*

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* Reported by Mr. John Glen, Clinical Clerk.

Progress of the Case.—*December 11th.*—Crepitation more diffused over right back. On left side respirations still dry and harsh. Chlorides absent from urine. *Dec. 12th.*—Crepitation now audible over left back. Lithates in urine more abundant. Discharge of saliva still copious, but greatly diminished in amount. Pulse 80, weak. *Habeat Vini* ℥iij *per diem.* *Dec. 13th.*—Chlorides in urine again perceptible. *Dec. 14th.*—Chlorides in urine abundant. Crepitation posteriorly diminishing, sputum still copious, frothy, and somewhat gelatinous. Breath continues to give off the mercurial fœtor. *Dec. 15th.*—Last night had copious diaphoresis, followed by great relief in his breathing, Still a few crepitations posteriorly, increased vocal resonance, more marked on left than on right side. Urates very abundant in urine. From this time he gradually improved. On the 21st all moist rale had disappeared, but respiratory murmurs harsh posteriorly, and vocal resonance still increased. *Dec. 26th.*—Still a coppery taste in the mouth. Yesterday felt hungry for the first time, and was ordered an egg for breakfast and steák for dinner. From this time he rapidly recovered, and he was dismissed, January 2, 1856.

Commentary.—In this decided case of pneumonia, with absence of chlorides from the urine, we had an opportunity of observing the effects of mercurial salivation on the progress of the disease. If it be contrasted with many other cases of the same kind previously recorded, it will be seen that the disease itself was in no way shortened by the exhibition of mercury. Resolution commenced on the fourteenth, but was not completed till the twenty-first day. On the other hand, the unpleasant effects produced by the mercury, the severe swelling of the tongue, soreness of the gums and profuse salivation, must not only be regarded as so many increased evils and unnecessary symptoms superadded to the original disease, but as being the cause of prolonging the convalescence. For although the leading physical signs had disappeared on the twenty-first day, he could not eat until the twenty-sixth day, in consequence of the coppery taste in his mouth. But as soon as nutrients could be taken, he recovered rapidly. No fact could better demonstrate the utter uselessness of the drug, and its occasional mischievous effects.

Case CXXX.*—*Pneumonia of Right Side—Critical Diarrhœa on the Twenty-first Day—Recovery.*

History.—James Murray, æt. 53, a hawker—admitted June 30th, 1854. Has been much subject to coughs and colds, from exposure to the weather, when following his employment. On the 24th inst., at noonday, he was seized with rigors, sharp cutting pains in the right side, anorexia, thirst, and headache. These symptoms confined him to bed, and became so severe that he says he has been occasionally delirious. The treatment has consisted only of a blister, which was applied to the right side of the chest.

Symptoms on Admission.—On admission, percussion over the chest anteriorly is normal, but posteriorly there is marked dulness over the lower two-thirds, on right side, where there is much pain on coughing, and on taking a deep inspiration. On auscultation over the dull portion, crepitation is audible, especially at the base, with tubular breathing above, and bronchophony. No expectoration. Pulse 112, of good strength. Tongue furred, great thirst, loss of appetite complete. Severe headache, urine of a reddish colour, and contains no chlorides. Other organs healthy. *To have* ʒiss *Tr. Hyoscyam. at bedtime, and ½ grain Antim. Tart. and M* x. *of Sol. Mur. Morph. every second hour.*

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* Reported by Mr. Almeric Seymour, Clinical Clerk.

Progress of the Case.—*July 3d.*—To-day the chlorides have appeared in the urine in small quantity ; pain in side diminished. Pulse 110, soft. Physical signs the same. *To have* ℥ij *of wine—discontinue Tart. Ant.—R. Potassiæ Acet.* ℈iv ; *Sp. Æther Nit.* ʒij ; *Aquæ* ℥iv. *M.* ℥j *to be taken three times a day. July 4th.*—Urine contains abundance of chlorides. *July 9th.*—Still dulness, crepitation, and bronchophony over right chest. No expectoration. *July 13th.*—Blister to be applied to the right side. *July 15th.*—This morning he was seized with vomiting, followed by purging. He had 7 or 8 stools. To-day he is much better. The right chest unfortunately could not be examined, on account of the soreness of the blistered surface. But from this time he rapidly improved. On the 24th still slight crepitation. Has never had expectoration. On the 26th the crepitation still continuing, I ordered him to lie on the abdomen. On the 30th crepitation absent. *August 4th.*—Dismissed cured.

Commentary.—This case exhibited a rare negative symptom in pneumonia, viz., the complete absence of expectoration, all the other symptoms and signs being present. In this and the two subsequent cases I looked for the usual critical appearance of lithates in the urine about the fourteenth day, but in vain. It is somewhat remarkable also, that in these cases, instead of presenting the usual signs of crisis by urine, they were seized with sudden diarrhœa, of a severe character, but of short duration, which ushered in convalescence. Whether this was attributable to any choleraic disposition, or peculiar state of the atmosphere, must be unknown ; but I have never previously seen diarrhœa so uniformly critical in cases of pneumonia as occurred during the summer of 1854. The crepitation continued to linger in the minute bronchial tubes long after the pneumonia had disappeared. This I attribute in such cases to congestion from decubitus, and find it easily removable by causing the patient to lie as much as possible on the abdomen.

Case CXXXI.*—*Pneumonia of Left Side—Critical Diarrhœa on the Fourteenth Day—Recovery.*

History.—Thomas Shepherd, æt. 23, a brassfounder — admitted July 11, 1854. He says that he had always been a strong and healthy man, until the third instant, when on rising in the morning, he was seized with rigors, dull pain in the left side and loins, thirst, anorexia, headache, and cough. On the previous evening he had walked far, perspired much, and gone to bed exposed to a draught from his window. On the 5th, a medical man administered purgatives and other medicines, probably salines. On the 7th, dyspnœa became urgent, and the feverish symptoms were augmented. He was then bled to the extent of 18 or 20 oz., which occasioned much relief.

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* Reported by Mr. Almeric Seymour, Clinical Clerk.

Symptoms on Admission.— On admission, the left side of chest does not expand equally with the right. Anteriorly, the left lung is resonant, but posteriorly dull on percussion over its two lower thirds. On auscultation over the dull part, loud tubular breathing, with crepitation and bronchophony, are heard. Respirations 24 in the minute. Sputa scanty, of gelatinous consistence, tinged of a rusty colour. Pulse 84, soft, but of good strength. Tongue red and dry; appetite diminished; urine contains no chlorides. Other functions healthy. *To take ¼ gr. of Antim. Tart. and* ♏ v *of Sol. Mur. Morph. every second hour.*

Progress of the Case.— *July 13th.*—To-day the tubular breathing is gone; crepitations abundant and coarser. On adding a drop of nitric acid to the urine, a faint white haze is visible. *July 14th.*— Urine to-day contains abundant chlorides. Pulmonary signs the same. *July 16th.*— To-day was seized with pains in the abdomen, and diarrhœa. *July 20th.*— Diarrhœa has continued until to-day but is now checked. Pulmonary crepitation ceased; no expectoration, only slight bronchophony and dulness. From this time he rapidly recovered, and was dismissed well, July 31.

Commentary.—The bleeding on the fourth day in this case, though, according to the patient, it caused temporary relief, evidently produced no modification in the progress of the pneumonia, which ran its natural course, and terminated like the former one, by a critical diarrhœa.

Case CXXXII.*—*Double Pneumonia—Critical Diarrhœa on the Twenty-first Day—Recovery.*

History.— James M'Naughton, æt. 34—admitted June 30, 1854, a shoemaker. States that he has been much addicted to the use of intoxicating liquors. From the 21st to the 23d inst. he was in a continuous state of intoxication, and on the morning of the 24th he awoke with dull pain in the chest, great dyspnœa, cough, and expectoration of matter, which, he says, resembled pure blood. He has undergone no medical treatment.

Symptoms on Admission.— On admission, the respirations are 44 in the minute. On percussing the chest anteriorly, there is slight dulness on the right side inferiorly, but posteriorly the dulness is very marked over the inferior 3-4ths of both lungs. On auscultation, dry tubular breathing is heard over the dull parts, with bronchophony, but on taking a forced inspiration, coarse crepitation, deep-seated, is audible; respiration at both apices and over chest anteriorly puerile. Pulse 120, weak. Tongue covered with a yellowish fur, thirst, no appetite, headache; general appearance sallow — indicative of exhaustion; he complains of great weakness. Urine of deep cherry red colour, sp. gr. 1020, contains no albumen or sediment, and no chlorides. Other functions normal. *To have ⅙ of a grain of Antim. Tart. every three hours;* ℥iv *of wine daily.*

Progress of the Case.— *July 3d.*— The wine was increased to ℥vj daily, his symptoms having undergone no change. *July 4th.*— To-day chlorides have appeared in small quantity in the urine, which presents the same cherry-red colour. Crepitation audible in left lung posteriorly, right lung as before. Sputum lighter, with less of the prune juice appearance. *July 7th.*— Since last report there has been marked improvement. To-day the urine contains abundant chlorides. Crepitation over both sides of chest posteriorly. *To have* ♏ xl *of Sp. Æther. Nit. and* gr.

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* Reported by Mr. Almeric Seymour, Clinical Clerk.

xx *of Potas. Acet. in solution thrice daily. July 10th.*— Over the whole of back posteriorly coarse crepitation; still bronchophony, and abundant sputum, tinged with blood. *July 15th.*—Last night was seized with diarrhœa. He had six copious watery stools. To-day no crepitation audible; respirations natural, except in left supra-scapular region, where bronchophony is still audible, but not so harsh as formerly. Urine now clear and in every way normal. From this day he rapidly improved, and was dismissed, August 2d, quite well.

Commentary.—This was a very severe case of double pneumonia, in a broken-down and dissipated individual, who was saved by wine, and in whom a choleraic diarrhœa, accompanied by vomiting, proved critical on the twenty-first day. It is unnecessary to multiply proofs, or to give stronger evidence of the correctness of those principles of treatment, which have already been given at length, p. 274, *et seq.*

On the Diagnostic Value of the Absence of Chlorides from the Urine in Pneumonia.

Simon and Redtenbacher first stated that chloride of sodium, a salt always present in healthy urine, was absent from that fluid during the onward progress of pneumonia, and returned to it when absorption of the exudation was about to commence. This statement was confirmed by Dr. Beale of London, who, in the 35th vol. of the Transactions of the Medico-Chirurgical Society of London, furthered our knowledge regarding it by additional valuable researches. My attention was directed to this remarkable fact during the Session 1853-4, by Dr. Robert Cartwright, a gentleman attending the Clinical Wards of the Infirmary, who informed me that he had seen it occasionally of great service in a diagnostic point of view, in the clinical wards of Professor Oppolzer at Vienna. It so happened that a man, John M'Donald, æt. 25, had just been admitted, labouring under well marked simple pneumonia at the apex of the right lung. He was a labourer, who had enjoyed perfect health until two days before admission, when, on being exposed to wet and cold, working at drains, he was seized with shivering, followed by fever and the usual symptoms and signs of pneumonia. On adding a drop of nitric acid to some of his urine in a test tube, and then dropping into it a little of the solution of the nitrate of silver, the fluid remained clear, although so great is the delicacy of this test, that a white cloudy precipitate is at once formed, if a very minute quantity of the chloride of sodium be present. It was on the fourth day of the disease that the observation was first made, and the chlorides remained absent during the fifth and sixth days, during which period the disease extended from above downwards, until it occupied the upper two-thirds of the right lung. On the seventh day a slight haze was observed in the urine, indicating that the salt was returning to that fluid, and the man expressed himself as being much better. On this day there was great dulness on percussion, all crepitation had ceased, the breathing was tubular with bronchophony. On the eighth day, slight returning crepitation was audible, the dulness had diminished, but the urine, owing to some accident before the visit, had been thrown away. On the ninth day, however, the chlorides were abundant in that fluid, together with lithates; loud crepitation was now universal throughout the lung, and the dulness had nearly disappeared. From this time the man made a rapid recovery, never having been bled, and was discharged quite well on the sixteenth day.

I now requested Mr. Seymour, one of the clinical clerks, to test the urine of all the patients in the ward, and others who might subsequently be admitted, which he did, and thus collected a large number of observations, the results of which I shall allude to immediately. In the mean time another case entered, which seemed to point out the value of this test in a diagnostic point of view. It was that of a man, Donaldson, æt. 26, labouring under typhus fever, in whom the disease ran its usual course to the tenth day, when chlorides were demonstrated in it. On the eleventh day, however, pulmonary symptoms came on, and the chlorides were entirely absent from the urine. This led me to make, with the clinical class, a careful examination of the chest, when all the signs of pneumonia were detected in the lower half of the right lung. On the fourteenth day the chlorides reappeared, the pneumonic signs diminished, and the fever ceased with a critical sweat.

A third case was even more satisfactory in proving the moment of commencing and departing pneumonia by testing the urine for chloride of sodium. A man called David Murray, æt. 43, entered with pneumonia of the lower two-thirds of the right lung. No consistent account could be obtained from him as to when the disease commenced, and it was impossible, therefore, to determine whether the coarse crepitation which was audible over the inflamed lung was the advancing or returning crepitation; but the chlorides were absent from the urine, which indicated that the disease was advancing. The following day complete consolidation had occurred, with dry tubular breathing and absence of crepitation, and a minute quantity of the chlorides was found in the urine. The patient, however, instead of getting better, showed no improvement, and the next day the chlorides had again disappeared, indicating extension of the pneumonia. On the evening of this day he was seized with acute meningitis, of which he died. On dissection, in addition to universal cerebral meningitis, the whole of the right lung presented the usual characters of grey hepatization. (See Case IV.)

It will be observed in all the preceding cases, eleven in number, that with the exception of Case CXXV., the absence of chlorides marked precisely the onward march of the pneumonia, whilst their presence indicated its cessation, and was generally accompanied by the returning crepitation and commencing absorption of the exudation. It still remains to be determined whether the absence of the salts is a cause or a result of exudation into the lungs—whether the interference to the respiratory function, by diminishing the amount of oxygen absorbed, gives rise to those chemical changes in the blood which react on the urinary secretion. If so, what is the nature of these changes? Indeed, a crowd of questions will be suggested to the mind of the physiologist, from the establishment of the remarkable clinical fact of which we are now speaking. That such is an important diagnostic sign I have now no doubt, and it was singularly well tested in the following case, in which there were many signs and symptoms of pneumonia, complicated with heart disease. The question on admission was whether, with heart disease and bronchitis, pneumonia might not be conjoined, and I was assisted in answering in the negative by the abundance of chlorides which the urine contained.

CASE CXXXIII.* — *Bronchitis and Pulmonary Congestion, from Morbus Cordis, resembling Pneumonia, but no absence of Chlorides in the Urine.*

HISTORY.—John Dickson, æt. 44, pensioner—admitted July 21st. Says that on the evening of the 19th he was seized with chilliness, followed by sweating, heat of skin, thirst, impaired appetite, and expectoration of a frothy fluid, resembling liquorice juice. He has for some time felt an uneasy sensation in the epigastrium, which, since his recent illness, has amounted to pain. Yesterday he experienced great dyspnœa and anxiety, symptoms which have continued until now.

SYMPTOMS ON ADMISSION.—On admission there is excessive dyspnœa, with expectoration of a tenacious sputum, of a reddish-brown colour. On percussion, there is no comparative dulness, but posteriorly the resonance is impaired on both sides. On auscultation anteriorly, the expectoration is everywhere much prolonged, and posteriorly there is considerable crepitation with bronchophony. Pulse 92, of good strength. The heart's sounds are entirely masked by the prolonged wheezing expiration and agitation of the chest. He cannot lie on his back or left side, is easily agitated, frequently experiences palpitations, and cannot sleep. Abundant chlorides in the urine. Other functions normal. ℞ *Sp. Æther. Sulph.* ℥ss; *Aq. Cassiæ* ℥iv. *One table-spoonful to be taken in water occasionally. To have ¼ grain of Ant. Tart. in solution every two hours.*

PROGRESS OF THE CASE.—*July 25th.*—Since last report the dyspnœa has diminished, the crepitation posteriorly continues, but the wheezing anteriorly is less. Still gelatinous sputum, specked with rusty-coloured blood. The apex of the heart cannot be felt, but a double blowing murmur is now recognizable, accompanying both the first and second sounds—the systolic, loudest at the apex, and the diastolic, loudest at the base. *Omit the Antimony. July 31st.*—The pulmonary symptoms and signs have now greatly subsided, whilst the cardiac lesion has become more distinct. For this latter he remained in the house until the commencement of November, when he was dismissed greatly relieved.

Mr. Seymour tested with great care, and at repeated times, the urine of upwards of fifty other cases in the wards, embracing a great variety of disease. He found the chlorides absent in one case of phthisis, with intercurrent pneumonia, but in no other. They were also absent in one case of peritonitis, and in all the cases of small-pox. Further investigation will probably discover these salts to be absent in other diseases, which, although it may diminish the importance of the sign as distinctive of pneumonia, leaves unaffected its value as pointing out the onward progress of that disease.

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* Reported by Mr. Almeric Seymour, Clinical Clerk.

In one or two cases of pneumonia, in which the disease was progressing, traces of chlorides were seen in the urine. This was discovered by Mr. Seymour (clinical clerk) to depend on an adulteration of the nitric acid, which, for testing urine, must be pure. The nitric should be tested according to the directions of the Edinburgh Pharmacopœia for hydrochloric acid, with which it is very apt to be mingled. It is of importance that pure nitric acid be added to the urine in the first instance, otherwise the nitrate of silver is very apt to throw down phosphates, which, however, may be distinguished from chlorides by being dissolved in an excess of nitric acid, which does not affect the latter salts. It is also useful, to avoid error from the presence of phosphates, to add an equal bulk of distilled water to the urine before adding the test.

What is very remarkable with regard to the absence of chloride of sodium from the urine, is that it appears in the sputum of pneumonic persons, and as it returns to the urine, it disappears from the sputum. I have not myself, however, made many careful observations on the chemical reactions of the sputum in this disease, but propose doing so, in the hope that it will throw further light on its diagnosis and pathology.

The General Pathology and Treatment of Acute Pneumonia.

The pathology of pneumonia is comprised in what has been formerly said on exudation, p. 136, and more especially p. 276, the lesion consisting of liquor sanguinis poured into the air vesicles, minute bronchial tubes, and parenchyma of the lung. It may be well, however, to dwell a moment on the fact that the exudative process may be very limited, indeed confined to a few vesicles, and the minute bronchial tubes connected with them. This is *vesicular pneumonia.* We know it may be confined to a lobule or occupy an entire lobe, constituting the so-called *lobular* and *lobar pneumonia.* In either case the essential phenomenon of inflammation, that is exudation, has occurred, at first distinguishable on careful examination of the pulmonary tissue, by the blocking up of a few air vesicles in the form of minute granulations. Occasionally the vesicular pneumonia may be felt on handling the lung, in the form of minute indurations, varying in size from a millet seed to that of a pea—often red, but occasionally yellow, and in the latter case very liable to be mistaken for tubercles. Such small indurations, however, at length soften, and are converted into pus, like the lobar and lobular forms of pneumonia.

Microscopic examination of the pulmonary tissue shows us, in the first instance, that the air vesicles, the minute bronchi, and the areolar tissue, are infiltrated with a molecular and granular exudation, which often forms a complete cast or mould of the vesicles and bronchi, easily separated mechanically by washing and pressure. Not unfrequently, as shown by Remak, they are expectorated entire, and may be disengaged from the gelatinous matter with which they are associated, by throwing the contents of the spit-box into water, and teazing out the branched filaments. These, when magnified, present a fibrous exudation, in which are embedded commencing pus corpuscles, with a greater or less number of epithelial cells. Such portions of exudation as remain in the lung, are transformed into pus in the usual manner (Fig. 357, p. 276), become ultimately disintegrated and absorbed into the blood, where they are chemically changed, and at length excreted from the system, principally by the kidneys. If, from the extent of the disease, or weakness of the patient, this process is checked, the patient may die, either from inability to excrete the effete matter in the blood, or from interruption to the respiratory functions. If the exudation be limited in extent, or have been poured out slowly from the commencement, it may become what is called chronic. Under such circumstances, the epithelial and pus corpuscles of the pulmonary tissue may undergo the fatty degeneration, and numerous compound granule cells be the result. If blood should have been extravasated, mingled with the other formations described, there will be often found red crystals of hæmatine, blood corpuscles surrounded by an albuminous layer, and presenting the numerous transformations which they are known to undergo after extravasation. (Fig. 370).

In a paper recently published by Dr. Todd,* he observes, "When a patient suffers from pneumonia, the tendency is for the lung to become solid, then for pus to be generated, and at last for the pus-infiltrated lung-structure to be broken down and dissolved. Such are the changes when matters take an unfavourable course. On the other hand, recovery takes place, either through the non-completion of the solidifying process, or by the rapid removal, either through absorption, or a process of solution and discharge, of the new material, which had made the lung solid." Now I have directed especial attention to the method in which the exudation is absorbed, and frequently examined lungs after death in the stage of red hepatization, where death had occurred from cerebral hæmorrhage or other disease. In some lungs there has been a pneumonia in all its stages, incipient in some places, solidified and red in others, grey and purulent in a third. In all these places, a gradation in pus formation has been observable. In the most solid hepatization, young pus cells may be observed somewhere beginning to form, so that I am convinced that the exudation is always broken down through the agency of purulent formation—in short, that this is the normal process. I have never seen any evidence that a coagulated exudation is simply disintegrated and absorbed without the development of pus cells, and I conceive that all analogy as well as direct observation is opposed to this supposition. It follows that, so far from the formation of pus being the evidence of an unfavourable course of the disease, it is the normal and necessary transformation of the solid exudation, whereby it is broken up and caused to be absorbed. See Fig. 357, p. 276.

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* Beale's Archives of Medicine. No. i. p. 2.

I have previously, at some length, endeavoured to point out that the principles which have hitherto guided us in our treatment of internal inflammations are erroneous (p. 266, *et seq.*) An inquiry into the results of the past treatment of acute pneumonia (p. 280, *et seq.*), shows that an antiphlogistic treatment, as formerly practised, was attended with a mortality of 1 case in 3; that the treatment by large doses of tartar emetic led to a mortality of 1 case in 5; that the result of more moderate bleedings is a mortality of about 1 case in 7; but that a treatment directed to further the natural progress of the disease, as I have explained it, has been in my practice 1 case in $21\frac{2}{3}$. Since then, I have met with four other cases of pneumonia, making my sum total of pneumonic cases treated in the clinical wards, 69, of which 3 have died, making a mortality of only 1 case in 23. All these fatal cases, however, as previously explained, were complicated ones, so that I have arrived at the conclusion, that pneumonia occurring primarily in healthy persons, so far from being a dangerous malady, will almost always get well, if exhaustion be prevented, by securing rest, avoiding lowering remedies, giving slight salines and diuretics to favour excretion of the morbid products, and wine and nutrients should the pulse be weak. Local pain will be best relieved by warm fomentations or poultices.

While such is what I now believe to be the best practice in acute pneumonia, it is not to be denied that many cases have got well rapidly who have been moderately bled. If, indeed, from twelve to eighteen ounces of blood be taken from a strong, vigorous individual, during the first two or three days of the disease, it frequently for a time diminishes dyspnœa and other local symptoms. But if pneumonia really exist, that is, if exudation has occurred, we have no proof whatever that the disease has ever been shortened or otherwise permanently benefited by the practice. Whilst, then, it seems to be of no real advantage, there can be little doubt that in many cases, where weakness or want of stamina exists, it prolongs convalescence, and, if this be excessive, may render the disease fatal. Still, as a palliative, blood-letting to a small amount, say eight ounces, may be had recourse to, always taking care to avoid it in individuals with a weak and soft pulse, or feeble frame, while at the same time nutrients and the other treatment described should be followed. A case, however, requiring even such modified depletion must be regarded as a great rarity. In the same way, some pneumonic patients may escape any evil from mercurial salivation, but that this is ever beneficial or shortens the disease has not yet been shown. (See Appendix.)

CASE CXXXIV.*—*Chronic Pneumonia of Upper Third of Right Lung—Gangrenous Abscess—Recovery.*

HISTORY.—Betsy Brown, æt. 48, married, a washerwoman—admitted September 12th, 1856. Had always enjoyed good health until the 22d of last month, when, in consequence of exposure to cold and wet, she experienced rigors, followed by heat, but without headache, thirst, or loss of appetite. This was followed by cough and expectoration, symptoms which have continued ever since. Two days ago she brought up a tea-spoonful of blood.

SYMPTOMS ON ADMISSION.—She complains of pain in the right hypochondrium, under the false ribs, not increased by inspiration. On percussion there is dulness over right apex anteriorly, and upper third of the right lung posteriorly. Inspiration heard over dull area is harsh, with occasional snoring during expiration. Vocal resonance greatly increased. Sputum scanty, tenacious, purulent, with brownish streaks. Other portions of lungs healthy; no friction audible. Slight giddiness, tinnitus aurium, and feeling of weakness. Pulse 80, equal, and of moderate strength. Hepatic dulness normal. Other functions well performed. ℞ *Tr. Opii. Camph.* ℥ss; *Vin. Ipecac.* ʒij; *Mist. Scillæ ad* ℥vj. *A table-spoonful to be taken three or four times a day.*

PROGRESS OF THE CASE.—*September 14th.*—Expectoration more free. *A blister to be applied to upper part of right chest anteriorly. Sept. 29th.*—There has been little change, except on the day before yesterday, when she vomited her food, complained of headache, and presented slight febrile symptoms. Pulse to-day is 80, and weak; no shivering. Bowels costive. *A saline mixture, with* ℥iv *of wine, and to have* ℥ss *of Castor Oil. Oct. 2d.*—Sputum and breath during the last few days have been of an offensive odour. It is copious, purulent, of a somewhat dirty yellow colour. Fine crepitation is now audible on inspiration under the clavicle, and extending down to third rib, with sibilation during prolonged expiration. Posteriorly over dull region, respiration is feeble. Over lower two thirds of right lung, respiratory murmurs greatly exaggerated; patient feels very weak. *To have* ℥vj *of wine daily. Oct. 5th.*—Over right lung posteriorly, moist rales are now heard; below spine of scapula they are very coarse. Expiration is prolonged, loud, and tubular. Vocal resonance amounts to bronchophony immediately below spine of scapula. *Oct. 10th.*—Since last report has continued to be very weak, with feeble pulse at 80, notwithstanding employment of nutrients and wine, which she has no appetite to avail herself of. Cheeks flushed; skin hot, with general febrile symptoms. Sputum copious, still fœtid, and considerably stained with dark blood. No evidence of lung tissue on microscopic examination. Posteriorly, immediately below spine of scapula, the moist rattles are very coarse, with bronchial resonance of the voice approaching pectoriloquy. *Continue nutrients and wine. Oct. 20th.*—The amount of sputum has gradually declined since last report, and the coarse moist rales also have slowly disappeared from right back. There is now dry cavernous breathing, with pectoriloquy below spine of right scapula. *Dec. 11th.*—Since last report she has been alternately better and worse, the sputum being sometimes copious, and at others scanty, but not fœtid. Moist rales also have occasionally, on the former occasions, returned in the right back, with more or less sibilation on expiration. For some days there has been harsh inspiratory murmur at apex of left lung, and with prolonged expiration, without dulness on percussion, but with considerable increase of vocal resonance. *Has been taking cod-liver oil. Dec. 26th.*—Since last report there has been a gradual improvement in her general health. Appetite has returned, and her strength permits her to sit up during the day. No moist rales are audible in right back, but loud tubular breathing, with increased vocal resonance. *Jan. 20th.*—Has been for some time apparently quite well, and says she enjoys perfect health. Tubular breathing and bronchophonic resonance of voice, with dulness on percussion, are still present over upper third of right back. At left apex, also inspiration somewhat harsh, with increase of vocal resonance. Dismissed.

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* Reported by Mr. John Glen, Clinical Clerk.

Commentary.—In this case a woman, 48 years of age, who tells us she had always enjoyed good health, is attacked with moderate fever, cough, and expectoration, with all the physical signs of a pneumonia in the upper third of the right lung. The sputum becomes fœtid, and a gangrenous abscess forms, from which she slowly recovers, under the action of nutrients and wine, leaving, however, as traces of the disease, evidence of condensation in the pulmonary tissue affected. In all such cases there is extreme difficulty in separating the disease from phthisis. Indeed, there is little pathological distinction between a chronic pneumonia and pulmonary phthisis. Moreover, the latter, though the real disease, may supervene upon the former, of which the following is an example :—

CASE CXXXV.*—*Chronic Pneumonia of both Lungs, with Ulceration—Death—Great Condensation, with Cavities and Pigmentary Deposits in the Lungs—Chronic Tubercle in various Organs—Disease of both Supra-renal Capsules, without bronzing of the skin.*

HISTORY.—John Cunningham, æt. 52, married, a shoemaker—admitted December 8th, 1856. He states that having previously been in the enjoyment of good health, three months ago while walking he became heated, and took off part of his apparel. On his return home he was attacked with shivering and severe pains in the breast and lumbar regions. A violent cold ensued, but he continued his employment. Three weeks ago he was obliged to give up work. A blister applied to the chest to-day, before admission, has mitigated the pain there.

SYMPTOMS ON ADMISSION.—Percussion over left front of chest gives almost tympanitic resonance, but the tone is flat, with a strong sense of resistance. Crack-pot sound is elicited in second intercostal space. Over right side, resonance more full and less tympanitic, but still somewhat flat. Posteriorly same flat tone, with a resonance not fully clear. On auscultation, marked increase of vocal resonance over left apex, also over left supra-scapular region ; elsewhere normal. At left apex, inspiration and expiration are blowing and cavernous in character, and expiration is prolonged. After cough, fine moist sounds are heard at close of inspiration. Laterally large moist sounds are more or less heard with inspiration, and coarse in character, while expiration is loud in tone. On right side same moist sounds are heard, coarser in character, with both inspiration and expiration. Posteriorly respiratory murmurs somewhat loud. No moist rales, except over right supra-scapular region. Expiration is everywhere prolonged. Cough is violent, accompanied with a great quantity of frothy, tenacious, and somewhat dirty and blackish-looking sputum, with a few streaks of blood. Pulse 88, small and weak. Urine, sp. gr. 1021 ; voided in small quantities, of a high colour, throwing down a large quantity of lithates. Chlorides plentiful ; other functions normal.

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* Reported by Mr. W. Guy, Clinical Clerk.

Progress of the Case.—*December* 11*th.*—Under left clavicle to-day, hoarse cavernous rales, with both respiratory murmurs, accompanied with faint and distinct crepitation and bronchophony. Posteriorly on left side, loud, tubular breathing, with both murmurs at apex. Inferiorly fine crepitation, mixed at the termination of inspiration with a loud sibilant murmur. *Dec.* 15*th.*—To have a blister applied over sternum. *Dec.* 17*th.*—Complains of indigestion and feverishness. Pulse 100, hard, but compressible. ℞ *Acetatis Potass.* ʒj; *Aquæ Acet. Ammon.* ℥j; *Aquæ ad* ℥vj. *M. A table-spoonful to be taken every three hours. Dec.* 18*th.*—Feverishness has disappeared; sputum of a dark-brown colour; is not fœtid. On microscopic examination, numerous well-formed pus cells are seen, but no pulmonary tissue. *Dec.* 23*d.*—Takes nourishing diet with ℥iv of wine. Says he eats all his food. Anxious to go out, but cannot on account of weakness. *January* 2*d.*—Countenance expressive of great weakness, sallow and pale. Tongue covered with a brown crust; dry, hard, and cracked. Pulse 108, weak; cough at night severe, preventing sleep. Physical signs unaltered; cannot rise to sitting posture without aid. *Jan.* 8*th.*—Died at 1 o'clock P.M.

Sectio Cadaveris.—Forty-seven hours after death.

Thorax.—The upper lobe, and upper half of middle lobe, of right lung condensed and indurated. On section, the cut surface presented an iron-grey passing into a black colour. At the apex there was a cavity resembling a tubercular one about the size of a walnut. The inferior portion of this lung also somewhat condensed, but more spongy. The whole of left lung condensed and indurated. On section, the same iron-grey colour was everywhere observable except at the base, where there existed masses varying in size from a hazel-nut to that of a chestnut, of a dirty red coloured hepatization. Portions of the condensed tissue everywhere sunk in water. At the apex and at the back of this lung below the pleuræ, which were adherent, there was a cavity four inches long, and about an inch in breadth, with very irregular broken down walls. This communicated with several smaller anfractuous cavities. Heart normal.

Abdomen.— Slight simple constriction of the pyloric orifice of the stomach. Over the mucous surface of the small intestine, extending from the termination of the ileum to about two feet of the end of the duodenum, were numerous cicatrices of former ulcers, with everted edges, and the surrounding mucous membrane puckered and drawn in. There were a few similar cicatrices in the large intestine. The mesenteric glands were a little enlarged, and contained yellow tubercular matter. The right supra-renal capsule felt thick and hard, and weighed 290 grains. It was everywhere infiltrated with yellow, opaque, tubercular looking matter of solid consistence, but friable under pressure. Perhaps about one-tenth of the gland only presented its natural texture. Two tubercular masses, the size of filbert nuts, were present in the left supra-renal capsule, surrounded by indurated tissue. One-fourth of its texture was natural. Other organs normal.

Microscopic Examination.—Fluid pressed from the iron-grey and black hepatization contained—First, A great number of large granule cells. Secondly, Numerous pigment cells. Thirdly, Colourless epithelial cells, isolated and aggregated in masses. Some of these cells were peculiarly colourless and resembled those in waxy textures. Fourthly, A few starch and celloid bodies. Fifthly, Numerous pigment and fatty granules floating loose. On making a section of this tissue with a Valentine's knife, these elements were seen everywhere infiltrating the pulmonary texture. The fluid pressed from the dirty-red coloured hepatization, in the base of the opposite lung, contained numerous pus corpuscles with epithelial cells; comparatively few granule cells, and no pigment. A portion of the grey exudation, which here and there resembled infiltrated tubercle, was composed of amorphous molecular matter. The yellow masses in the supra-renal capsules presented the characteristic structure of tubercle.

Commentary.—This man's account of his case (and he seemed very intelligent) was, that the pulmonary disease commenced in the manner described, three months before admission. He also denied having been ever seriously ill before. Yet the examination after death revealed evidences in the lungs, intestines, mesenteric glands, and supra-renal capsules, of chronic tubercular disease. The fever, rapid ulceration of both lungs, and subsequent prostration, as in the last case, however, were apparently owing to a pneumonia, which became chronic. In such a case, the vital powers were unable to effect those rapid changes which we have seen to be the characteristic of acute pneumonia, and he died. The diagnosis between such a disease and phthisis pulmonalis, I regard as impossible. The two forms of exudation present similar physical and vital characters. In neither this nor the former case, was the general appearance of the patient, or history of the disease, in any way similar to that of phthisis; and practically it is of little moment whether we have to do with a low form of exudation in young persons, which we call tubercle, or a similar one in old persons which we call pneumonia. In this case, however, there was tubercle of a chronic character in several organs, and among others in both supra-renal capsules, although there was certainly no bronzing of the skin during life.

Case CXXXVI.*—*Gangrene of the Lungs—Dysentery.*

History.—Thomas Marshall, æt. 29, a chimney-sweep—admitted November 23, 1852. He states that he has been troubled with slight cough for many years back. Eight weeks ago, he experienced rigors without any obvious cause, followed by increase of the cough, looseness of the bowels, severe griping pains in the abdomen, and frequent desire to go to stool, with much straining and tenesmus. He observed a small quantity of blood in the stools, which sometimes consisted only of about a table-spoonful of blood mixed with frothy mucus. The calls to stool were at first so numerous that he cannot state even the probable number in the twenty-four hours. They abated somewhat under treatment at one of the dispensaries, but the diarrhœa has continued more or less ever since. During the last eight weeks the cough has become much aggravated, and the sputa increased in quantity. Two days before admission, he observed that the sputa were of a dirty red colour, having formerly consisted of thick purulent masses without any tinge. He states that for the last eight or ten weeks he has been losing flesh and strength to a great degree, though he does not present a very emaciated appearance. His diet also, during that period, has been very defective, both in quantity and quality; but previously he had always been able to procure good food. He is addicted to the immoderate use of spirits, and has several times had delirium tremens.

Symptoms on Admission.—On admission, the chest on percussion appears resonant throughout, except over the upper third of right lung, where very slight dulness can be detected. The respiratory murmur is heard all over the chest, but under the right clavicle it is harsh and exaggerated, and the vocal resonance greatly increased. Posteriorly, there is comparative dulness on percussion, and increased vocal resonance over the whole of right side, but most marked at the apex. Over the lower third, on the same side, fine crepitation can be heard during forced inspiration. Sputum in large quantity, consisting of frothy tenacious mucus, of a dirty brown colour, becoming more fluid upon standing, and of very offensive odour. When examined by the microscope, numerous pus-cells, some blood corpuscles, and large quantities of disintegrated epithelium, can be detected. Has no pain in chest. Breathing is not laboured, but cough is troublesome, especially at night, occurring in paroxysms. Expectoration difficult. The tongue is dry, with slight, dirty-yellow fur; troublesome thirst, but appetite good. No nausea, but frequent inclination to vomit when the cough is severe. No uneasiness in the bowels when at rest, but griping pains are generally present when at stool. There is distinct tenderness on percussion in the right iliac region, over a space of about two inches. The bowels have been open six times during the last twenty-four hours. The stools are very copious, of thin fluid consistence, and of a brownish-red colour. They contain numerous blood-corpuscles, as determined by the microscope. The urine is passed in small quantity, but otherwise normal. There are slight tremors of the hands, but no other symptoms of delirium tremens. Other functions normal. ℞ *Tinct. Opii*, ʒij; *Tinct. Catechu*, ℥ss; *Confect. Aromat.* ʒij; *Mist. Cretæ*, ℥v. *M. A table-spoonful to be taken every four hours. Habeat Enema, cum Tinct. Opii*, ʒj. ℞ *Æth. Sulph. m.* xl; *Mucilaginis*, ʒij; *Mist. Camph.* ℥j. *Fiat haustus. To be taken at bed-time. Ordered also nutritious diet and 4 oz. of wine.*

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Progress of the Case.—*November* 26.—Bowels open nine or ten times during the twenty-four hours; stools watery, having distinct traces of blood. Much griping pain when at stool. Cough severe. Expectoration copious. *Dec.* 1.—Diarrhœa continues, notwithstanding he has taken regularly the astringent mixture and opiate enemata. To-day the skin is hot and dry, the appetite bad, with great thirst. *To have a 5 gr. pill of lead and opium every third hour. Dec.* 2.—Has had four or five stools since last night. They are fœculent, but of very thin consistence, unmixed with blood. He feels very weak, and complains much of pain in the chest, especially on the right side. Dulness on percussion is increased over the whole of the right side posteriorly, and is most marked over the lower third. There is great increase also of the vocal resonance, amounting to pectoriloquy in the supra-scapular region; loud moist rales, like gurgling, are heard over the right back. On the left side the respiration is harsh and exaggerated, and the vocal resonance is also loud. Breath and expectoration fœtid. *Omit the lead and opium pill, and continue the medicines ordered on the 24th. Dec.* 6.—Diarrhœa abated; but he feels very weak, and cough troublesome; crepitation, with increased vocal resonance, pretty general over the left back. *To have 3 oz. of spirits. Dec.* 9.—Diarrhœa has returned—stools thin and fœcal, containing a good deal of blood. *To have a starch injection with Tinct. Opii*, ʒiss. *Dec.* 14.—Diarrhœa abated somewhat until to-day, when it has again returned as severely as before. Much pain in lower part of abdomen; considerable griping and tenesmus; pulse 100, small and weak, but regular. *The opiate enema has been continued every evening since last report, and he has been taking a chloric æther and morphia mixture to relieve the spasmodic cough. Apply a blister* 4 x 3 *to the abdomen. Increase the wine to* 6 *oz. Dec.* 18.—Has rallied greatly since last report, but to-day the diarrhœa has again returned. The cough is very troublesome—sputa tinged with blood; over the whole of the right back there are harsh gurgling rales, with a noise approaching to a metallic character when he coughs; mucous rattles heard over left back; the offensive odour of breath and sputa has increased since last noticed. To have the following draught at bed-time. ℞ *Sol. Mur. Morph.* ʒj; *Tinct. Catechu* ʒj; *Mist. Cretæ* ℥j; *Spir.*

Ammon. Aromat. ʒss. *M. Sumat hora somni. Jan.* 1.—Little change has taken place in the symptoms since last report. One day he has appeared to sink, but has rallied again the next. Diarrhœa has continued, averaging about twelve stools in the twenty-four hours. The stools consisted of very small quantities of dark matter, with mucus, and occasionally a little blood. Has continued taking the mixture of ammonia, etc., and the astringents with an opiate enema, which has latterly been administered twice a-day. Died this morning at five A.M.

Sectio Cadaveris.—Thirty-one hours after death.

Body much emaciated.

THORAX.—Heart and pericardium normal. Right lung united to thoracic walls by firm and universal pleuritic adhesions. On its being removed and bisected, a black gangrenous cavity, five inches long and four broad, was exposed, occupying the upper and middle lobes. It contained an extremely fœtid olive-green diffluent matter, having no distinct structure. The walls of the cavity presented a firm lining membrane of condensed fibrous tissue, internally of pulpy consistence and blackish-brown colour. The surrounding pulmonary tissue, posteriorly and inferiorly, was hepatised and friable, with a few anfractuous cavities also gangrenous. Anteriorly the lung was emphysematous, with here and there portions of collapsed tissue. The left lung adhered to the thoracic walls posteriorly by pleuritic adhesions. On being removed and bisected, the lower lobe and inferior portion of upper lobe was congested, and presented a brick-red colour; hepatised and dense in various places, with irregular cavities containing fœtid brown sloughs, varying in size from that of a pea to a pigeon's egg, and communicating more or less with each other.

ABDOMEN.—Mucous surface of cœcum and ascending colon closely studded with irregular-shaped ulcerations, varying in size from a pin's head to a sixpence. Some of these were evidently chronic, and in process of healing, with a thickened worm-eaten edge and a bluish granular base; others contained a sloughing centre, involving more or less of the muscular coat. Similar ulcers were scattered, but more sparsely, through the transverse and descending colon. Other abdominal organs healthy.

Commentary.—In this case we have an example of pneumonia in both lungs, which passed into gangrene, associated with acute dysentery, occurring in an individual whose constitution had been impaired by addiction to intoxicating drinks. Dysentery generally prevails during the autumn months, in Edinburgh, to a greater or less extent; and in the case of Marshall it came on without any obvious cause in September, and was ushered in by rigors, followed by bloody and purulent discharges at stool, with tenesmus and abdominal pain. About the same time, also, pectoral symptoms were complained of, although it is not probable that decided pneumonia was then occasioned. Even when he came into the house it was limited in extent, and ran a tolerably acute course subsequently. The febrile symptoms, therefore, which existed previous to his admission, were most probably connected with the dysentery. This ran its usual course, producing sloughing ulcers in the mucous membrane of the large intestines to a considerable extent; and by the irritation and continued discharge they occasioned (which could not be checked), gradually prostrated the patient, and was the chief cause of his death.

It is seldom we have an opportunity of seeing a more illustrative case of gangrene of the lungs, than this man presented—large and circumscribed on the right side, extended and diffused on the left side. That, in both cases, the gangrene was preceded by pneumonia, there can be little doubt, as all the functional signs of the lesion were present during life, whilst after death the gangrenous cavities were everywhere surrounded by distinct pulmonary hepatization. There is every reason to suppose that the same general causes which produced the sloughing sores in the intestines, occasioned the gangrenous cavities in the lungs. A deficiency of vital power in the organism prevented those transformations necessary for the absorption of the exudation, and thus it died and underwent putrefaction. Inflammatory gangrene and ulceration both depend on death of the exudation, but in the former case there occur those peculiar chemical changes which induce putrefaction. The only symptom which indicates this change is fœtor of the breath or of the sputum, which was very apparent in Marshall on his admission to the house, and was greatly increased afterwards. In the following case which entered the ward in 1848, and was the subject of careful examination, I diagnosed a gangrenous cavity in the right lung, and separated it from phthisis, partly on account of the fœtid odour, and partly on account of the situation and limitation of the cavern.

CASE CXXXVII.* — *Gangrenous Abscess of the Right Lung, caused by the Swallowing of a Piece of Chicken Bone four and a half years previously.*

History.—Thomas Neal, æt. 27, a footman, of sober habits—admitted December 4th, 1848. He says that he was quite well up to four years and a half ago, when, while eating part of a chicken, and laughing, he was suddenly seized with coughing and a sense of suffocation producing lividity of the face. He thinks he swallowed a portion of chicken bone, but is by no means sure. At all events, he experienced a severe pain at the time across the lower part of the chest, followed by a short, dry, tickling cough, accompanied by a wheezing noise in the throat. In an hour he recovered and went about his usual employment. The cough, however, continued, and after three months was accompanied by a frothy expectoration, which gradually increased. About three years ago he entered St. George's Hospital, London, but was dismissed in a fortnight. Shortly after, he observed blood in the sputum, which now became fœtid. He has laboured under constant cough, with expectoration of fœtid pus and more or less blood ever since.

Symptoms on Admission.—On admission he complained of frequent cough and profuse expectoration of a viscid, slightly frothy matter, stained with blood and of gangrenous odour. He was pale, but by no means emaciated. On percussing the chest, there was considerable dulness over the two inferior thirds of the right lung, both anteriorly and posteriorly. At a point a little below the right nipple, the dulness was more marked than either above or below. On auscultation there was great increase of the vocal resonance over the whole right side of the chest, most so over the dull spot below the nipple. Posteriorly about the middle of the lung, there was a circumscribed gurgling rale, heard over an extent about two inches square, and not audible above or below it. At this point also there was perfect pectoriloquy. The respiratory murmur over the other parts of the lung was harsh, and here and there accompanied by mucous and sibilant rales. These signs were less evident at the upper than over the lower two-thirds of the organ. Over the left lung the percussion was normal, the respiratory murmurs puerile but otherwise healthy. All the other functions were well performed, if we except the occasional loading of the urine with lithates, and trifling perspiration at night.

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* Reported by Mr. James Struthers, Clinical Clerk.

Progress of the Case.—The treatment was directed to supporting his strength, giving cough and antispasmodic mixtures, and introducing a seton below the right nipple. This produced considerable local irritation, but caused diminution in the gurgling rale, expectoration, and cough, so much so, that he insisted on leaving the Infirmary, February 8, 1849. He continued, however, to be attended by the clinical clerk, now Dr. James Struthers of Leith, from whose report the following account is taken:—"Towards the middle of March his appetite and strength began to fail; he lost flesh and became feverish, thirsty, and restless; was obliged to confine himself to the house; and suffered from shortness of breath, even when at rest; the cough and expectoration continued much the same; he had no rigors, and was free from pain. On the morning of the 24th, he awoke suffering from great increase of cough and shortness of breath, and continued during the day to expectorate, at intervals of a few minutes, large quantities of frothy sputa, deeply tinged with blood, and much more fœtid than usual. I was asked to visit him at his own house on the 25th, and found him much weaker than when I had last seen him some weeks previously. The cough was constant, the expectoration profuse, the sputa frothy and mixed with florid blood; the breath and sputa had a gangrenous odour which was very perceptible on approaching the bed. He had no pain, his chief complaint being of great weakness, dyspnœa, and occasional feeling of suffocation. The respirations were 45; the pulse 130, weak and wiry. On examining the chest, the right side was found scarcely to move on inspiration, and was universally dull on percussion; all natural respiratory sound was absent; gurgling was audible over its greater part, both in front and behind, with coarse mucous and subcrepitant rale towards the upper and lower parts. Although the voice was weak, the vocal resonance was much increased, and there was very distinct bronchophony over the inferior two-thirds. There was no friction sound audible. The left side was very resonant, and, with the exception of puerile respiration, and some subcrepitous rale, inferiorly, presented nothing unusual. During the next three days, he became rapidly weaker; the cough and dyspnœa increased; he could speak only in monosyllables; the respirations rose to 68, and the pulse to 140; and he expectorated daily about two pints of thin bloody sputa, which had a strong gangrenous odour, and latterly flowed in an almost continuous stream from the mouth. On the 29th, he became typhoid, had hiccup and slight delirium, and died in the evening."

Sectio Cadaveris.—Thirty-six hours after death.

The features were much collapsed; there was some yellowness of the skin; and a copious discharge of thin brown fluid from the mouth and nostrils. Percussion of the chest elicited the same sounds as during the last days of life.

Thorax.—The right lung, with the exception of the lower part of the anterior border, was found firmly adherent to the walls. The adhesions were short, dense, and of a white colour. The lung was removed without laceration; it was somewhat diminished in bulk, of a dark red colour, and had a pulpy feel. The apex was occupied by a closed cavity, the size of a small orange, which was distended with a brown dirty-looking fluid of the consistence of cream, and having a most intense gangrenous odour. The wall of this cavity approached the pleura superiorly; its inner surface was very irregular, presenting numerous shreds of disorganised pulmonary tissue. At the middle of the lung posteriorly, and about half an inch from the surface, there was another cavity, the size of a walnut, lined with a dense grey-coloured membrane, one line in thickness, and broken up in several places; it was partially filled with a dirty-coloured fluid, and opened directly into a bronchial tube, the size of a crow quill, at the other extremity of which the foreign body was found at a future stage of the dissection. In the neighbourhood of this cavity, and throughout the whole of the inferior and posterior parts, the lung was riddled with numerous small cavities, varying in size from that of a hazel nut to that of a pea. Some of these were closed and filled with a fluid similar to that found in the one at the apex; others were nearly empty, more or less anfractuous, and communicated freely with the bronchial tubes; the walls of some were formed of a thick dense membrane; those of others were soft and ragged. The middle part of the anterior, and a small portion of the inferior border were in a state of grey hepatization, and were the only parts free from cavities. On laying open the *right* bronchus, a small piece of bone was found at the bifurcation of the middle primary division; it was lying almost loose, and came away without any force being used; it was quite clean, and bore a strong resemblance to part of a vertebra of a small animal, being of an irregular elongated form, and presenting several sharp spicula. The mucous membrane at the part was thickened, but quite free from ulceration, and not more vascular than that of the other bronchi. The *trachea* and the *bronchi* of both lungs were stained of a dark grey colour, but otherwise presented nothing abnormal. In the left *pleura* there were three or four ounces of clear serum. The lung was healthy, except a small portion at the inferior border which was hepatized. and studded with small, grey, indurated nodules, the size of corn-pickles. These consisted, as ascertained by the microscope, of accumulations of altered epithelium, with much granular fatty matter. The apex of the lung was free of deposit, and there was no tubercle in any part. The *bronchial glands*, especially those on the right side, were greatly hypertrophied, several of them being as large as pigeons' eggs; they contained no foreign matter. The *heart* was of the normal size; its muscular and valvular structures were healthy; and all the cavities contained both firm decolorised and dark loose clots. The *blood*, examined under the microscope, presented the red and white corpuscles in the usual proportions.

Fig. 400.

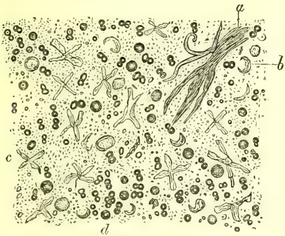

Fig. 401.

Abdomen.—The abdominal viscera were in all respects normal.

Microscopic Examination.—The fluid from the abscess at the apex of the right lung, on being examined under the microscope, was found to contain small shreds of fibrous tissue, broken down pus globules, and a large number of crystals of the triple phosphate and of the urate of ammonia. Fig. 401.

Commentary.—The physical signs in this case clearly indicated the

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Fig. 400. Fragment of chicken bone found in the right bronchus, in Neal's case.

Fig. 401. Fluid in the chronic abscess of the right lung in Neal's case. *a*, Fibrous tissue; *b*, broken down pus cells; *c*, crystals of triple phosphate; and *d*, urate of ammonia.—(*James Struthers.*) 250 *diam.*

existence of a cavity in the right lung, which, from its position, and from the general history of the case, was not likely to be tubercular. On the other hand, its gangrenous character was revealed by the peculiar odour, and his account of its origin rendered it probable that the cause was a foreign body impacted in the bronchus. At the same time, he was never very certain as to the fact of having swallowed the piece of bone, and in many conversations I had with him on that point, he invariably stated that such was merely his impression, but he was not sure. It is of importance to notice this fact, because it seems very probable that when in St. George's Hospital, his account may have been a doubtful one there also, and may have prevented recourse to an operation which then might possibly have been undertaken with success. It would be interesting to know whether at that time his chest had been carefully examined by auscultation, or whether general symptoms only were attended to, and that in consequence of these being slight, he had been dismissed in a fortnight. Certainly, it cannot be imagined that if any certainty existed as to the impaction at that time of a foreign body in the lung, no effort would have been made to extract it, especially when the uniform ultimate fatality of such an occurrence is taken into consideration. At all events, this case points out how, in a young man of perfect health, structural disorganization slowly, but surely, proceeds after such an occurrence, and it strongly inculcates the necessity of early, careful examination and of operative interference.

PHTHISIS PULMONALIS.

CASE CXXXVIII.*—*Phthisis Pulmonalis in its last Stage, with Incompetency of the Aortic Valves—Cod-liver Oil and Nutrients—Complete Recovery.*

HISTORY.—Patrick Barclay, æt. 15, admitted June 25, 1849. His previous history indicated that he had been of scrofulous habit from infancy. He had attended school regularly until a week ago, but could not take much exercise on account of a sore leg, which originated twelve months previously in a fall. His diet has for a long time been very poor. On the 18th he was attacked with cough, and this has continued till admission. He also complains of dyspnœa on exertion.

SYMPTOMS ON ADMISSION.—On admission, he is excessively emaciated. He complains of cough, which is sometimes very prolonged, but has no pain nor difficulty of breathing. The chest expands well on inspiration. Cough easily excited, and occasionally severe. Sputa viscid, frothy, and tinged with blood. On percussion, there is great dulness on the right side, especially under the clavicle; the left side is also dull to a slight extent. On auscultation, distinct bronchophony, loud friction rale, and mucous rale, approaching cavernous, are heard in the upper right side in front; and these become more faint towards the lower part of the lung. On the left side, friction rales are also heard in the upper part in front. Behind, on the right side, vocal resonance, not so distinct, but rales the same as in front. Pulse 114, strong and sharp. The heart's apex beats below sixth rib; impulse increased; but percussion does not indicate lateral expansion. On auscultation, a chirping musical murmur is heard over the apex of the heart, at the end of the first sound. This murmur becomes much more faint towards the base. To the left of the manubrium of the sternum, a bellows murmur takes the place of the second sound. This murmur is quite concealed by loud friction rales, when respiration is going on, but is immediately perceived when the patient holds his breath. Tongue slightly furred; appetite good; some thirst. Bowels regular. Urine natural; sp. gr. 1020—not coagulable. The chest, face, and arms, are covered with an eruption of prurigo, which he has had several times. On the right thigh, towards the lower part, there are several cicatrices, and three sinuses, which communicate with dead bone. Is much troubled with sweating, which at night is very profuse. *To have good diet with sweet milk morning and evening, and a dessert-spoonful of Cod-Liver Oil three times a day.* ℞. *Mist. Scillæ* ℥iv; *Tinc. Opii Ammon.* ℥ss; *Aq. Cinnam.* ℥iss; *Aq. font.* ℥iij. *M. Half-an ounce three times a day.*

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* Reported by Messrs. Hugh Balfour, Sanderson, and Dewar, Clinical Clerks.

Progress of the Case.—*June 30th.*—Friction rale less. Gurgling rale on right side. *Upper part of chest to be rubbed with Tartar Emetic Ointment. July 2d.*—Chirping murmur has become faint, and occasionally is inaudible. Has vomited his food several times. *Half a drachm of Naphtha to be added to mixture; to have beer for drink.* 5*th.*—Chirping murmur quite gone. 8*th.*—Chirping murmur returned. Cough severe, causing vomiting. Eruption, brought out by ointment, painful. *Omit the Ointment and Mixture.* ℞ *Pulv. Tragacanth. Co.* ʒi; *Naphthæ medic.* ʒi; *Sol. Mur. Morph.* ʒiij; *Syrup. Aurantii* ℥ss; *Mist. Scillæ* ℥v. M. *A table-spoonful thrice a-day.* 21*st.*—A seton was introduced beneath the right clavicle. Still vomits in the morning, but takes food and medicine better. *Aug.* 6*th.*—The expiratory murmurs under right clavicle are now quite dry. Vomiting is diminished. *Omit the Mixture.* ℞ *Ferri Citrat.* ʒss; *Tinct. Aurantii et Syrupi*, āā ℥ss; *Infus. Colombæ* ℥vi. M. *A table-spoonful three times a-day.* 12*th.*—The seton discharges freely, causing great irritation, and is to be withdrawn. *Sept.* 7*th.*—Appearance of patient much improved. Sounds of cavity in chest continue dry. *Takes now again a table spoonful of the oil three times a-day. Oct.* 28*th.*—Musical murmur has entirely disappeared. He is becoming quite fat, and is able to go about the ward all day. Complains only of slight cough at night, and palpitation on exertion. The right infra-clavicular region is becoming flat. *Omit the mixture and also the Cod-Liver Oil. Nov.* 18*th.*—Cough has returned, with slight mucous expectoration; and, on auscultation, mucous and sibilant rales are heard all over the chest. Ordered to recommence the oil. ℞ *Mist. Scillæ* ℥vss; *Vini Ipecac.* ʒij; *Sol. Mur. Morph.* ʒi. M. *A table-spoonful three times a-day.* From this time he rapidly improved. The cavity became perfectly dry, and respiration over it was accompanied by blowing murmurs. Cough and expectoration greatly diminished. His general appearance is healthy, and he is very stout. On *January* 13*th*, it is noted that, on percussion, a distinct cracked-pot sound is heard in the right infra-clavicular region, and faintly also on the left side. On auscultation the heart's sounds are loud all over the chest, the second sound being accompanied with a distinct bellows murmur. Musical murmur has never returned. There is bronchophony and prolonged expiration in the right infra-clavicular region, but no moist sounds. Sleeps well, and is very little troubled with cough. Does not sweat; is very fat; appetite good. This boy, as far as all general symptoms are concerned, may be regarded as having been in good health for the last two months. *Feb.* 27*th.*—On percussion, the chest was tolerably resonant on both sides; but there was slight dulness under the right clavicle. On auscultation, the inspiration is loud, and of a blowing character, in right infra-clavicular region; but the murmur is much softer than formerly. Expiration is still prolonged, and there is considerable vocal resonance, but not amounting to bronchophony—no moist rales. In the corresponding situation on the left side, the inspiration is somewhat harsh, and respiration slightly prolonged; vocal resonance normal; loud bellows murmur, with the second sound of the heart, heard over nearly the whole chest. His general health is good; he expresses himself as being quite well. He appears stout and strong; but his countenance is somewhat sallow and cachectic. He has no expectoration or sweating, and the cough is trifling, and only present in the morning. He is about to return to the Industrial School, and resume the learning of his trade as a shoemaker. Dismissed.

He was re-admitted *August 26th*, 1850.—Since leaving the house he has been frequently exposed to cold, but has been at the Industrial School; and latterly the cough and expectoration, which he said had quite left him, have returned, and been gradually getting more severe. The sweating returned with the cough. A week before admission, he, with the other boys of the school, went to Portobello to bathe, and, notwithstanding his remonstrances, the master insisted on his going into the water, saying it would do him good. He however became much worse. On admission, the physical signs were coarse moist rale under the right clavicle, imperfect pectoriloquy, and creaking friction noises, harsh inspiration, and prolonged expiration under left clavicle; but the dulness in this position is very slight, when compared with that of the opposite side. He again, by means of cod-liver oil, good diet, and counter-irritation, became strong and stout; again the cough, expectoration, and other symptoms ceased, and he was discharged *March 7th*, 1851. The report on that day, is "marked dulness and increased vocal resonance under right clavicle; the inspiration is harsh but dry."

Once again admitted *July 5th*, 1851.—He says that on leaving the ward in March last, he had two detached pieces of the right thigh-bone extracted by Mr. Syme, and remained in the surgical hospital for five weeks. Since then he has been constantly employed in light garden work, and, notwithstanding poverty of food, he has continued in tolerably good health till a week ago. On percussion, there is slight dulness only under the right clavicle, and posteriorly the resonance is good and equal on both sides. Under the right clavicle, the inspiration is heard to be harsh and blowing—no moist rale. There is also loud double friction murmur over the upper fourth of right lung, especially at the apex, and slight friction may be detected here and there over the whole of the right side. Under the left clavicle, inspiration somewhat exaggerated in tone, but the breath sounds everywhere normal. He looks pale and thin. There is severe cough, with mucous expectoration, but the appetite is good, and there is, on the whole, a marked improvement in his general appearance. Impulse of the heart and loud blowing murmur at the base still present. Wound in the thigh nearly healed.

FURTHER PROGRESS OF THE CASE.—He has continued to do well since his admission into the house. The cough rapidly diminished, and is now only present in the morning on waking. His bodily functions, he says, are in every respect perfectly well performed. The wound in the thigh is cicatrised, and were it not for the cardiac disease, this lad might be considered in robust health. The following is the result of a careful examination of the chest, made *December 23d*, 1851:—"On percussion, slight dulness under the right clavicle. On auscultation, inspiratory murmur somewhat harsh under both clavicles, but most so on right side. The vocal resonance also is slightly exaggerated over the apex on right side. In every other respect, the lungs appear to be healthy. There is great impulse of the heart still, and over the apex there is heard, with the second sound, a blowing murmur, which is very loud at the base. He remained in the house until *March 7th*, 1852, when he was dismissed in all respects perfectly well.

August 9th, 1852.—Presented himself at the visit to day. Since his dismissal in March has been employed by a dyer, and during his occupation has been greatly exposed to wet and cold. He has only been able to earn five shillings a-week, so that his diet has been very poor, both in quantity and quality. His health, notwithstanding, has been tolerably good, although he is now much thinner than when he left the Infirmary. On percussion there is clear resonance under both clavicles, but on the right side very slight dulness with increased resistance is perceptible. On auscultation, the inspiration under right clavicle is somewhat harsh, but the respiratory murmurs on the whole are very good. Vocal resonance slightly increased. Under the left clavicle there is harshness, with fine sibilation and friction during inspiration. The expiration is prolonged, and there is also slight increase of vocal resonance. The blowing murmur at the base of the heart with the second sound still very distinct. Otherwise is quite healthy. He has a sister settled at Philadelphia, and has formed the intention of joining her in the United States.

February 6th, 1853.—Presented himself at the Infirmary to-day, and was carefully examined by Dr. Bennett, Dr. Christison, the various clerks, and students. The physical signs are the same as at last report, the breath sounds, however, being more soft and natural. He has been prevented leaving for Philadelphia, as he intended last August, and since then has been carrying on the occupation of light porter to a dyer. His general health has been good, although he has undergone much exposure to cold and wet. He leaves for Philadelphia to-morrow, taking with him a letter recommending him to the care of Professor Wood of that city.

In a letter from Dr. Wood to Dr. Bennett, dated *March 28th*, 1853, it was stated that Barclay had presented himself a week previously. "Being at the time extremely busy, I gave the boy, who told me that he was quite destitute, a small sum of money, telling him to use it for his support; in the meantime to look out for employment, which is not difficult to be had in this country for persons of his class, and to call on me again before long. He promised to do so. I have not seen him since." In a subsequent letter (1856) from Dr. Dunglison, who at Dr. Bennett's request asked Dr. Wood concerning him, it appeared that he had not since been heard of.

Commentary.—I am not acquainted with any recorded case, which, throughout its progress, has been examined with more care, in which phthisis, in its last stage, was more unequivocally manifested, and which was more decidedly the subject of a complete cure, than the one now given. The lad was under my observation from June 1849 to February 1853, a period of forty-three months, and during that time he was respectively examined in the clinical ward by four winter and two summer classes of students, as well as by my professorial colleagues. Of the facts and accuracy of the record in the ward book there can be no doubt; and it is equally certain that we watched the arrest of tubercular condensation at the apex of the left lung, and the cicatrization of a large tubercular excavation in the apex of the right lung. Moreover, a careful study of this case will show that this result was not brought about by the mere spontaneous efforts of nature. On the contrary, great difficulties had to be surmounted, numerous symptoms removed, and most important complications guarded against. Indeed, the effects of treatment could never be more unequivocally manifested in any case than they have been in this. On admission, he presented the wasting characters of the disease in its last stage. The emaciation was extreme; the cough and sweating most distressing; and the physical signs demonstrated a cavity as large as the fist, in the right lung. Under the use of the oil his strength rallied. After a time it was given up, on account of his becoming so fat. Gurgling rales, and other signs of softened exudation, however, once more became apparent, and again disappeared when the use of the oil was resumed. He continued to take it from time to time afterwards, and it became apparent that the pulmonary signs varied according to his ability of digesting the oil. The same fact was demonstrated throughout the progress of the case, clearly showing the intimate relation which exists between the local disease and the general nutritive powers of the economy.

During no part of the time this boy was under treatment did he experience any difficulty in taking the oil. On the contrary, it occasioned no uneasiness in the stomach, and was readily digested, and this, although the food was at one period frequently vomited, owing apparently to the violence of the cough. Its influence on his general health was most remarkable, as well as upon the local disease in the lungs. From a state of extreme emaciation he became so stout that it was feared the oil would occasion obesity; and was therefore, for a time, discontinued. His appetite was always good—a circumstance I have noticed as being very favourable, not only for the beneficial action of cod-liver oil, but for the successful treatment of phthisis generally. Indeed, it is the anorexia, nausea, and dyspeptic symptoms which constitute the great difficulty the physician has to overcome in the management of the disease, as is well illustrated in the following case :—

CASE CXXXIX.*—*Phthisis Pulmonalis—Amendment from Treatment and Disappearance of Symptoms—Their Subsequent Return—Death.*

HISTORY.—Jane Hamilton, a dressmaker, æt. 18—admitted September 12, 1849. She stated that last April her general health began to fail; the appetite was bad; cough with expectoration came on; cold sweats appeared on the face, hands, and feet; the catamenia, which had never been very regular, were suppressed; and she became so weak that she could not stand. Since then there has been a temporary improvement; but for some time back she has again become worse.

SYMPTOMS ON ADMISSION.—On admission she was pale and emaciated, and so weak that she was unable to sit up above a few minutes at a time. There was copious perspiration during sleep, a severe cough, with abundant yellowish viscid sputa—no pain in the chest, which was well formed externally. The tongue was covered with a brown fur; appetite capricious and bad; bowels open every second day. The treatment consisted of tonics, expectorants, and counter-irritation to the chest, which produced considerable amendment. I took charge of the case in the middle of *October*, and found, on careful percussion, dulness below the right clavicle, with loud mucous rale over the upper third of right chest. There were also sonorous and sibilant rales over the greater part of both lungs, anteriorly and posteriorly. By means of expectorants and counter-irritants, the bronchitic symptoms and signs were subdued by the *1st of November;* but the dulness and moist rales under the right clavicle still continued. *A table-spoonful of cod-liver oil was then ordered to be taken three times a day.*

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* Reported by Mr. Alexander Struthers, Clinical Clerk.

Progress of the Case.—The remedy was suspended on the 8th, on account of a febrile attack she then experienced, which was ushered in with headache and rigors, and accompanied with accelerated but soft pulse, heat of skin, loss of appetite, frequent nausea and vomiting, and considerable spinal irritation. It was not until *November 30th* that these symptoms were so far removed, and the tone of the stomach augmented—by means, first, of antimonials, and subsequently of naphtha, alkalies, vegetable bitters, and stimulants—that the oil was again ordered. It produced considerable nausea, however, so that, after persevering in its use for ten days, it was again suspended. It was once more had recourse to on the *14th of December*, and was readily retained on the stomach. A fews days subsequently, the dose was increased to four table-spoonfuls daily. *December* 30.—There is now a very evident improvement in the general health. Her strength is so far increased that she sits up a considerable portion of the day. The perspirations have nearly disappeared. The expectoration is still thick and purulent, but not so copious. She is evidently much stouter, and the skin is of a more healthy colour. The catamenia have also reappeared. There is still dulness under the right clavicle on percussion. The coarse moist rale has disappeared, and a fine crepitating murmur only is heard with the inspiration towards the acromial end of the clavicle. There is prolonged inspiration, and increased vocal resonance. From this time she continued to improve. On the *1st of January* the oil was reduced to three table-spoonfuls daily. A small blister was occasionally applied to the upper part of the right chest anteriorly, and an expectorant mixture given to facilitate the expectoration, which, though diminished in quantity, retained its viscid and purulent character. On the *30th of January* the inspiratory murmur had acquired a certain degree of harshness, but here and there very fine crepitation could still be detected. She left the Infirmary on the *24th of February.*

I examined the chest carefully on the *7th of March.* There was still dulness, but not so marked as formerly, under the right clavicle; no crepitation on auscultation, but harshness of the inspiratory murmur, prolonged expiration, some friction noises, and increased vocal resonance. She was stout, of healthy appearance, and expressed herself as being quite well; but the expectoration of purulent matter still continued to a slight degree, with occasional cough. Shortly afterwards she went to Dundee to carry on her occupation as a milliner, when the confinement, late hours, and irregular food, soon caused a return of her more urgent symptoms. She again entered the Infirmary, and once more, after a few months, was dismissed relieved. On the last occasion, she was admitted under another physician, *August 19th*, 1852, the disease having progressed to its last stage during the interval. She died *September 8th.* No examination of the body could be obtained.

Commentary.—In this case, the local disease had not, on admission, proceeded to the advanced stage observable in the former one, for the physical signs in the girl exhibited at most bronchitis, with softening of the tubercular exudation at the apex of the right lung, whereas in the boy they demonstrated that a large cavity existed in one lung, whilst the other was also affected. There was the same general prostration, however, and the same emaciation, excessive weakness, profuse perspiration, purulent expectoration, and distressing cough. But there was this difference in the antecedent circumstances of the two cases—namely, that the boy had a good appetite, but had been subjected to an insufficient diet, whilst the girl had no appetite, although she possessed the means of gratifying it. In the first case nutrition was affected, from food being in deficient quantity, the digestive organs being tolerably healthy; in the second, it was brought about on account of the dyspepsia and disordered state of the stomach rendering it impossible that a sufficient quantity could be consumed. The result in both was the same,—namely, impoverishment of the blood, and tubercular exudation into the pulmonary organs.

The practical management of these two cases was considerably modified by the circumstances to which I have just alluded. In the boy, there was no difficulty in overcoming the imperfect nutrition. We have seen that he took the cod-liver oil, and digested it and his food with the greatest facility. In the girl, all thoughts of food caused disgust, and the cod-liver oil produced nausea, and for some time could not be tolerated. For a considerable period, therefore, my exertions in the treatment of this case may be considered as preparatory to the diminution of the phthisical symptoms, and intended to remove those complications which prevented any successful attack on the more important disease.

Thus my first efforts were directed to alleviating the bronchitis, which was accomplished by means of expectorants and counter-irritants. Cod-liver oil was then ordered, but it occasioned nausea, and was suspended on account of a febrile attack she now experienced. On her recovery from this, the nausea, vomiting, and dyspeptic symptoms were treated by means of naphtha, alkalies, vegetable bitters, and carminatives, with apparent benefit; but, on recurring to the oil, they again returned; so that, after persevering for ten days, it became again necessary to give up its employment. In a few days, however, it was once more tried, and on this occasion with success. It was then taken readily; a marked amendment followed; the dose was increased to four table-spoonfuls daily, and it was astonishing to see how rapidly she improved. Her strength increased, the emaciation and cachectic look disappeared, the skin assumed a healthy colour, and she became positively stout and fat, so that she was scarcely recognisable. The cough almost ceased, the expectoration greatly diminished, the perspirations did not appear at night, the catamenia returned, she sat up the entire day, and at length considered herself so well, that, on being allowed to leave the hospital for a day, she did not return. She called on me a few days afterwards, when I found that, although the constitutional symptoms had almost entirely disappeared, and her general health might be called good, traces of the local disease were still apparent, as stated in the report. This case, therefore, exhibits the obstacles which the physician has not unfrequently to overcome before he can carry out that line of treatment by means of which the abnormal nutrition is to be obviated, and the tubercular exudation checked; but it also inculcates the importance of perseverance, and exhibits the good effects which may result from persisting in a treatment dictated by correct pathological principles.

Notwithstanding the great benefit produced in this case, a return to imperfect diet and a sedentary employment once more induced all the symptoms and dangerous effects which in the hospital were removed with so much trouble. Nor, unless we could convert such institutions into establishments for the permanent support and surveillance of phthisical cases, is it easy to see how this can be prevented. Certain it is, that we are very seldom enabled to retain a case so long under treatment, as we did that of Barclay. Although, by means of judicious treatment, we frequently check the progress of phthisis, and restore the patient to a good state of health, it most commonly happens that the patient, if he be in a public hospital, insists on going out, and, if a private case, he abandons those remedies and precautions which are absolutely necessary to his existence. Hence it too frequently happens, that, even after such considerable amendment as we have seen take place—after restoration from a state of the most complete prostration to one of almost vigorous health—the causes which originated the disease induce its return, and the patient sinks, after one or more relapses. It is of all things most important, therefore, to keep a careful watch over phthisical cases long after the constitutional symptoms have disappeared, and, in fact, so long as the physical signs indicate any traces of the disease. This, for obvious reasons, can be accomplished much better in private than in hospital practice.

CASE CXL.*—*Phthisis Pulmonalis—Large Vomica on Left Side—Caries of Left Wrist Joint—Febricula—Variola—Scrofulous Nephritis.*

HISTORY.—John Finlay, æt. 19—admitted into the clinical ward December 20th, 1850. Says that he has been troubled with cough and expectoration, more or less, for the last six years, accompanied by occasional diarrhœa. For the last three weeks he has been in the surgical clinical ward, under Mr. Syme, for scrofulous caries of the left wrist joint. He has spat blood now and then, but to no great extent.

SYMPTOMS ON ADMISSION. — On percussion, the right chest is everywhere resonant; but there is marked dulness over the whole of left chest, most complete in the subclavicular and supra-scapular regions. On auscultation, loud mucous rales are heard over the whole of left chest anteriorly, with gurgling and pectoriloquy under the clavicle. Posteriorly and inferiorly on this side, there is a harsh tubular breathing, with prolongation of the expiration. There is puerile respiration on the right side, but otherwise nothing abnormal. His external appearance is pale, presenting all the so-called characters of the scrofulous diathesis. There is great emaciation, and development seems to have been arrested, as he does not look above 12 years of age. The left wrist-joint is immovable, considerably swollen, with several carious openings discharging pus. Frequent cough, with copious muco-purulent expectoration. Pulse 80, feeble. Tongue clean. Considerable nausea, and total loss of appetite. His diarrhœa has recently been checked by lead and opium pills. (For treatment see Commentary.)

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* Reported by Messrs. Sanderson and Dewar, Clinical Clerks.

Progress of the Case.—For the next three months the loss of appetite, sickness, and vomiting occurred at intervals, and the physical signs remained the same. From this period, however, his general health underwent gradual improvement, the cough was not so severe, and the expectoration became more mucous. The sweating greatly diminished, and he took food more readily. Towards the end of May, he had evidently gained much in flesh, and the discharge from the scrofulous sores in the wrist was trifling. The physical signs were so far altered, that the mucous rales over greater part of left side were not so coarse or diffused, and the gurgling under the clavicle was now of a splashing character, and more limited. Pectoriloquy in this situation was complete, and there was absence of expansion during respiration. There could now also be heard harsh inspiration, with prolonged expiration under the right clavicle; the resonance on percussion also was here slightly impaired. During June, he was much troubled with nausea and vomiting. On the 21st he was attacked with rigors, followed by all the symptoms of continued fever, which terminated by diaphoresis on the seventh day. Shortly after, he was attacked with variola, which ran its usual course. During July and August, there was gradual but marked improvement of his general health. At the end of the last-named month, the left wrist-joint was firmly anchylosed, but all the carious openings had closed up. He has had occasional diarrhœa. There was still dulness on left side, but the mucous rales were not heard so low down anteriorly. Fine crepitation with increased vocal resonance were now audible under the right clavicle. Up to the middle of October he continued slowly to improve, the sweatings and diarrhœa had ceased, and the cough was much less severe. He now complained of considerable pain during micturition, and on examining the urine it was found to contain numerous pus-corpuscles, and to be coagulable by heat and nitric acid. He continued to feel pain on urinating, and to pass pus by the urethra during the month of October. On the 3*d of November* the report is:—"Marked dulness on percussion over the left chest anteriorly, and under the clavicle cracked-pot sound. Posteriorly it is resonant. On auscultation, loud friction is heard from below up to the level of the nipple, and above this, loud mucous rattles passing into gurgling under the clavicle. Perfect pectoriloquy in this situation. On right side, puerile respiration; and posteriorly sibilant rale at the termination of the inspiration. No sweating or diarrhœa. Still occasional nausea and vomiting. General strength much improved, and now walks about the ward, sitting up a great portion of the day." The report on the 21*st of December* is:—"Still marked dulness over the whole of left side, except under the clavicle, where it is tympanitic, with cracked-pot sound. Resonance on right side good. Under acromial end of left clavicle feeble, and distant gurgling is heard—the respiration having more of a blowing character than formerly, with perfect pectoriloquy. The moist rales over the other parts of this side have disappeared. On right side, puerile respiration is heard over the inferior half of lung; otherwise, the breath-sounds are normal. Posteriorly dulness of the whole of left side, but there is no cracked-pot sound. On auscultation, the signs are the same as are heard anteriorly. His general health has much improved. Still complains of occasional nausea and vomiting, but on the whole takes his food well. Urine limpid, containing small shreds, which, on examination with the microscope, are seen to be composed of numerous pus-corpuscles embedded in mucus; slightly coagulable on the addition of heat and nitric acid. Pain on micturition diminished." From this time he continued, on the whole, to improve steadily, and was so well during the summer of 1852, as to walk about constantly in the open air, and went out of the house, by his own desire, on the 1st of the following August. About the middle of October, however, having been well in the interval, he fell down and injured his back. On the following day, he experienced rigors, followed by febrile symptoms, total loss of appetite, and hematuria. He was re-admitted November 1, when it was ascertained that considerable quantities of pus were passed with the urine, which, he says, had also been occasionally tinged with blood. There was pain on micturition, but none in the lumbar region. On examining the left lung, loud gurgling was heard both with inspiration and expiration, extending from the clavicle down to the upper margin of the third rib. There was great dulness on percussion. Below the clavicle, loud pectoriloquy, and lower down, œgophony. Under the right clavicle there was fine moist rale on inspiration, and increased vocal resonance, but the chest expanded well on this side, and was otherwise normal. The fever, prostration, and discharge of pus by urine continued without intermission, and he died December 4, 1852.

Sectio Cadaveris.—Forty hours after death.

Body greatly emaciated; the right carpal bones anchylosed, with marks of numerous old sinuses on the skin in their neighbourhood.

Chest.—Pleuræ on the right side adherent at the apex, by loose bands of chronic lymph. The right lung indurated at the apex over an extent the size of a hen's egg, and strongly puckered externally. On section, this indurated portion was seen to contain several encysted cretaceous concretions, with the intervening pulmonary substance condensed, hard, and fibrous. A few chronic miliary tubercles were also scattered through the upper lobe; but the rest of the lung was spongy, crepitant, and healthy. The pleuræ on the left side were everywhere firmly adherent, and over the superior half of the lung, which was much atrophied, they were converted into a dense white fibrous mass, three-fourths of an inch thick, which gradually diminished in thickness inferiorly. The left lung was not the volume of the closed fist; it was non-crepitant, felt indurated, but at the same time flaccid, evidently from internal cavities. On section, the entire mass was riddled with cavities more or less communicating with each other, containing purulent matter, and having a smooth lining membrane. Many of them presented a pouch-like form, and were identical with what has been described as dilatations of the bronchi. At the apex were two encysted calcareous concretions, of the size of millet seeds, but there were no other traces of tubercular deposits. The fibrous structure between the cavities consisted of a close dense fibrous texture, of bluish colour, from pigmentary deposits, in which no remains of pulmonary structure could be found. The bronchi contained a considerable quantity of viscid, muco-purulent matter. Heart, larynx, and trachea, healthy.

Abdomen.—The large intestines, especially the cœcum, were congested, exhibiting here and there patches of slate-coloured pigment, with traces of cicatrised ulcerations, together with one superficial chronic erosion about half an inch in diameter, of irregular form. The kidneys were of natural size, and on section displayed dilatation of the pelves, with pouch-like enlargements, the result of scrofulous abscesses, filled with pus. The secreting substance was everywhere atrophied, and the tubular substance in many places obliterated. Mesenteric glands and other organs healthy.

Microscopic Examination.—A careful microscopic examination of the lining membrane of the pulmonary abscesses exhibited nothing but fibrous tissue, destitute of epithelium. There was nowhere any trace of a mucous surface.

Commentary.—The treatment of this case was conducted on the principles, and according to the rules afterwards to be detailed. It was directed principally to improve the appetite, diminish the nausea, vomiting, and diarrhœa, and support the strength by means of cod-liver oil and generous diet. Externally, repeated blisters were applied. During the attack of febricula and variola, antimonials were given in small doses. Latterly numerous remedies were administered to lessen the pains during micturition, such as anodynes; uva ursæ; bals. copaibæ; diuretics, etc.; but an enema of starch and solution of morphia succeeded better than anything else. It was always observed that in proportion as the dyspeptic symptoms were relieved, and the assimilation of cod-liver oil and food took place, so his health improved; and by great care he was not only kept alive for two years, but I had sanguine expectation of an ultimate recovery, when he met with the accident which, by exciting acute disease in the kidneys, caused his death.

This case presented many points of resemblance to that of Barclay (Case CXXXVIII.), especially in the scrofulous diathesis and scrofulous caries of the bones, and the cavity under one clavicle, on admission. The diseased lung was more extensively affected however, and the derangement of the stomach more violent and persistent. Indeed, throughout the progress of his case, the chief difficulty in the treatment was the management of the stomach and bowels. The cod-liver oil and diet did not produce the same marked effect as in the case of Barclay, but their operation, though slow, was still very decided; and for a long time I considered that the pulmonary lesion in this lad was in progress of cure, exactly in the same manner as took place in Case CXXXVIII. The dissection after death demonstrated that in fact the lung was undergoing contraction, and that the tubercular disease was being arrested. It presented a remarkable specimen of one of the modes in which this is occasionally accomplished, namely, by the formation of pouches or cavities, the lining membranes of which become smooth, and cease to exude tubercle. This condition of the lung has been described by morbid anatomists under the name of dilated bronchi, and by Dr. Corrigan, as cirrhosis of the lung.[*] In the first case, it has been imagined to result from chronic bronchitis, whereby the bronchi are dilated from within;[†] and in the second, from the formation of fibrous matters, the contraction of which causes this enlargement from without. A consideration of the details of this case, however, must convince every physician that we had here to do with large tubercular excavations, which, by compressing the lung, had obliterated the whole of its texture and converted it into a contracted fibrous envelope of these excavations. All trace of tubercular matter had disappeared, with the exception of two small cretaceous concretions, and the respiratory function was entirely carried on by means of the opposite lung, in which chronic tubercle to a limited extent, and very latent, was found. Whether, under such circumstances, the pulmonary lesion would ultimately have healed, it is difficult to say; but there can be no doubt he must have lived a long time in this condition had he not met with the accident which caused his death. But that many such lesions may be arrested, and life continue, is proved by the observations of Reynaud, who has given figures of what he calls dilatations of the bronchi, many of which were evidently the result of tubercular ulceration.* Cruveilhier† has also figured a lung presenting similar appearances.

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[*] Dublin Medical Journal, vol. xiii. 1838.

[†] Laennec, vol. i. p. 201.

In the case of another man, called Joseph Finnie, which closely resembled that of Finlay, I diagnosed, during life, the same contraction of the lung from tubercular excavations, and the same chronic dilatations in connection with the bronchi. This man died of Bright's disease in the Royal Infirmary, January 1853; and on dissection a similar state of the pulmonary texture was discovered, with the exception that the atrophy of the organ was not so great, whilst traces of tubercular infiltration were more evident.

CASE CXLI.‡—*Phthisis Pulmonalis—Vomica on Right Side—Death from Hæmoptysis.*

HISTORY.—Walter Cairns, æt. 35, stone-cutter—admitted into the clinical ward February 10, 1851. On the 25th of last July he was discharged from the corps of Sappers and Miners at Gibraltar, in consequence of chest complaint. Shortly after, he was admitted into the hospital at Woolwich for a fistula in ano. He was discharged in March, and commenced work as a stone-cutter. In September, cough and expectoration came on—symptoms which have been gradually increasing until now.

SYMPTOMS ON ADMISSION.—On percussion, there is complete dulness under the right clavicle, extending three inches downwards. On auscultation, a loud mucous rale is heard in this situation, with bronchophony. On the left side, inspiration under clavicle harsh, and expiration prolonged. Frequent and severe cough, with purulent expectoration; constant pain in right side of chest; pulse 120, small and weak; tongue slightly furred; appetite greatly impaired; vomiting during severe fits of coughing; diarrhœa; profuse sweating at night. He is thin, but not emaciated. Fistula in ano still present.

PROGRESS OF THE CASE.—Towards the latter part of February, the mucous rale under right clavicle was changed into loud gurgling, and the bronchophony into loud pectoriloquy. All the other symptoms continued. During March, the diarrhœa considerably diminished, but the cough and expectoration increased so as to destroy rest at night. During April and May, the symptoms were stationary, but towards the end of the latter month, it was observed that the cough was not so severe, but that the breathing was more difficult. The dulness on percussion had extended

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* Memoires de l'Academie Royale de Medecine, tome 4^{me}., Plate 4, Fig. 1; Plate 5, Fig. 1; Plate 7, Fig. 2.

† Anatomie Pathologique, Livraison 32, Plate 5, Fig. 3.

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‡ Reported by Messrs. Cunningham and Calder, Clinical Clerks.

inferiorly, and moist rales could be heard over the whole right side, increasing in coarseness from below upwards. Increased vocal resonance also was more diffused, with strong fremitus. On the *5th of June*, diarrhœa returned, and the sputa were streaked with blood. On the 17th, the diarrhœa had abated, but he experienced great pain and annoyance from the fistula in ano, which poured forth a profuse discharge. On the 25th, three or four ounces of pure blood were expectorated. Cracked-pot sound is distinctly elicited on percussion below the right clavicle. Fine crepitation may also be heard during inspiration, under left clavicle, with increased dulness on percussion. Choking sensation in the throat; pain in epigastrium; no diarrhœa. *June 28th.*—The sputa have continued to be mingled with blood, and occasionally mouthfuls of this fluid, quite pure, have been expectorated. At four o'clock this morning, he brought up 10 oz. of blood, mingled with a matter resembling coffee grounds, apparently from the stomach. Shortly after, about 16 oz. of florid blood gushed from his mouth, when he sank back in the bed and expired.

Cod-liver oil and nutritious diet were given during the first few days, but the stomach was intolerant of it. Afterwards, the diarrhœa was combated by various astringents, such as opium, acetate of lead, tannin, and gallic acid. He also took, at intervals, quinine, sulphuric and nitric acids, and bitter infusions. In May, the suffocative cough was much relieved by an emetic of ipecacuanha and sulphate of zinc. The local pains in the chest were greatly relieved by the occasional application of a few leeches and blisters. During the two first attacks of hæmoptysis, gallic acid was given in two grain doses every hour, with cold effusion on the chest. Latterly, the vomiting was checked by a mixture of naphtha, Tr. of Cardamoms, and Inf. Columbæ.

Sectio Cadaveris.—Thirty-two hours after death.

The body, though thin, was not greatly emaciated, there being three-eighths of an inch of fat between the abdominal integuments. Lips and nostrils stained with blood which had issued from the nose.

Thorax.—Right pleural cavity contained about six oz. of fluid, and its serous walls were united by strong and close adhesions over the upper lobe of the lung. The left pleuræ are adherent by a few easily torn adhesions. Both lungs present anteriorly extensive emphysema, with considerable but uniform dilatation of the air vesicles. The bronchi on both sides contained bloody frothy fluid, the blood predominating on the right side. *Right Lung.*—The upper and a considerable part of middle lobe much diminished in volume posteriorly by compression. There are several irregular cavities in the summit, the largest not exceeding the size of a walnut, with indurated walls. The lower lobe consists of emphysematous and condensed tissue, the latter containing more or less miliary and encysted tubercles, some of the latter as large as a pea. Scattered throughout the inferior lobe, were numerous extravasated patches of blood, varying in size from a pin's head to that of a coffee-bean, but not interfering with the crepitation of the lung. *Left Lung.*—Below the pleura-costalis were numerous miliary tubercles, scattered over the whole surface, but aggregated more densely towards the apex. Here and there were some yellow tubercular masses the size of a pea, with puckerings corresponding to them on the pleural surface. On section, the summit of the organ contained small miliary tubercles. The substance of the inferior lobe contained very few, but was dense, less crepitant than usual, and contained some of the sanguineous patches observed in the opposite lung.

Other organs healthy.

Commentary.—This was a case of chronic phthisis, which on dissection presented old ulceration on one side, and recent tubercular deposits on the other. It proved fatal by extensive hemorrhage, which caused sinking in a previously debilitated person. The fistula in ano may have contributed to the weakness, for the surgeons who were consulted refused to interfere, on the ground that the operation was not likely to be successful in a phthisical individual. Death from hæmoptysis is on the whole a rare termination of phthisis. Dr. Walshe only met with two in 131 cases, and I believe the proportion to be even much smaller than this. He observes, that "a first hemorrhage having been severe, it is unlikely that a subsequent one will kill directly." But Cairns had three distinct attacks of hemorrhage, the last of which *was* directly fatal.

The treatment of this case was conducted by my colleagues for four months before I saw him, on the palliative plan; and I may appeal to the facts it presents, in proof that such treatment produced no effect in any way checking the progress of the disease. In this respect it offers a marked contrast to the preceding cases, in which the treatment was directed by the pathological principles to be afterwards detailed, and had for its object increasing the nutritive powers through the primæ viæ.

CASE CXLII.*—*Phthisis Pulmonalis—Two Vomicæ on Right Side—Small Cavities on Left Side—Death from Exhaustion.*

HISTORY.—Margaret Moffat, æt. 40, a washerwoman, was admitted into the clinical ward, April 5th, 1851. For upwards of three years she has been subject to cough, expectoration, and dyspnœa. Three weeks ago, after exposure to wet and cold, she was attacked with severe pain in the right side, and the other symptoms became aggravated. In this state she has continued until admission.

SYMPTOMS ON ADMISSION.—The report says, there was "little or no alteration on percussion." Over the part complained of in the infra-mammary region there were loud friction noises, which were also diffused posteriorly over the inferior third of right lung. Over the upper portion of the lung, anteriorly, were dry blowing sounds, with harsh inspiration; but posteriorly, crepitation was heard over the apex. Over the left back, fine moist rattles were heard. Sharp acute pain, increased on inspiration, below right mamma; cough troublesome, with copious expectoration of mucopurulent matter, here and there streaked with blood; considerable dyspnœa. Pulse frequent and soft; tongue covered with a brown fur; loss of appetite; thirst; skin moist.

PROGRESS OF THE CASE.—The pain in the side subsided on the following day, after the application of six leeches; but she complained, during April and May, of occasional return of the pain, and was particularly distressed, in addition to her other symptoms, by attacks of dyspnœa. I took charge of this case in the middle of June, when marked dulness was ascertained to exist over the upper third of the right lung, both anteriorly and posteriorly, with mucous rale and increased vocal resonance; and on the left side, posteriorly, there was still crepitation. Sputum continued abundant, consisting of purulent matter of gelatinous consistence. Appetite bad. Profuse sweating at night. These signs and symptoms underwent very little variation until her death, on the *30th of July*. The treatment consisted at first of leeches to the side, expectorant and anodyne mixtures, with an æther draught at night. In May she was ordered ℥vj of wine daily, decoction of senega, with ʒss doses of Tr. lobel. inflat. Towards the end of the month, blisters were applied externally, and dilute sulphuric acid given internally, in doses of ten drops. In the middle of June, chalybeate and tonic mixtures were ordered, with cod-liver oil, without any effect in restoring the appetite or renovating the nutritive process.

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* Reported by Messrs. Pearse and Hoile, Clinical Clerks.

Sectio Cadaveris.—Forty hours after death.

Body greatly emaciated.

Thorax.—There were three or four ounces of fluid in the left pleura. Everywhere firm adhesions between the pleuræ on the right side. At the apex of the right lung, the pleuræ were thickened to the extent of an inch, by the formation of a dense, white, fibrous structure. *Right Lung.*—There were two cavities at the apex, of irregular shape, and the size of hens' eggs. Numerous smaller ones existed, scattered throughout the lung. The pulmonary tissue was almost entirely non-crepitant, dark coloured, atrophied, and indurated. Inferiorly there were nodules of a pink fleshy material, which, on microscopic examination, were found to consist of fatty degeneration, and were composed of a multitude of fatty molecules and granules, with compound granular corpuscles. The bronchial glands were much enlarged, several of them indurated, and the size of a walnut. *Left Lung* was mostly crepitant, but contained some indurated tissue, surrounding small cavities at the apex, the largest the size of a hazel-nut. In the lower lobe, posteriorly, there was some œdematous and non-crepitant tissue. Bronchial glands also enlarged, but less than on the other side.

All the other organs healthy.

Commentary.—This must have been a very chronic case of phthisis, probably of much longer standing than she stated on coming into the house. The right lung was universally condensed, contracted, and nodules of the tubercular matter itself, mingled, perhaps, with pneumonic exudations, had passed into fatty degeneration, and presented a yellow pinkish colour. There were none of the more violent symptoms of deranged digestive action in this case, such as vomiting or diarrhœa; and I would again point to the fact, that the palliative treatment entirely failed to make any impression on the malady.

Case CXLIII.*—*Phthisis Pulmonalis—Large Vomica with Pneumo-Thorax (?) on Left Side—Softened Tubercle on Right Side—Bright's Disease.*

History.—James Hutchison, æt. 26, a stone-mason—admitted into the clinical ward June 16th, 1851. Last September, after unusual exposure to wet and stormy weather while prosecuting his occupation, was seized with distinct rigors, followed by severe pain in the chest, dyspnœa, and cough. The cough and pain left him in January, but the dyspnœa has continued. About the end of last March, he observed œdema of the legs, and that the urine was diminished in quantity, and was occasionally high coloured. These symptoms have continued since.

Symptoms on Admission.—There is marked dulness on percussion over the left side of chest anteriorly and posteriorly, most complete inferiorly. On auscultation, the respiratory murmurs are absent at the lower two-thirds of left lung; but over the superior third there is loud gurgling, both anteriorly and posteriorly. Vocal resonance is everywhere increased, but over the apex there is a harsh, brazen, almost metallic sound, on coughing. Posteriorly and inferiorly, there is œgophony. On the right side, there is dulness in the subclavicular and supra-scapular regions, with crepitation and increased vocal resonance. The rest of the lung is resonant, with harsh and puerile respiration. Cough prolonged and reverberating; sputum scanty, muco-purulent; pulse 72, soft; urine diminished in quantity, of deep red colour, sp. gr. 1020, highly coagulated by heat, and on the addition of nitric acid; great debility, with a feeling of weakness in the lumbar region; appetite bad; thirst; acid taste in the mouth; nausea after taking food; bowels loose, but no diarrhœa; considerable emaciation; skin anæmic; inferior extremities œdematous; prepuce and scrotum much distended; general anasarca, but not to so great an extent as has previously existed.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Progress of the Case.—The pulmonary signs and symptoms remained the same, but under the action of the digitalis and squill pills, and a chalybeate mixture, with tonics and carminatives, the anasarca greatly diminished in ten days. The urine also became clear, but retained its coagulability. Vomiting, however, appeared; he could take no food, and the general weakness increased. He insisted on going out, though in a dying condition, on the *30th of June*, and expired a few days afterwards.

Commentary.—The extent of the disease in this case, involving the whole of one lung, and part of the other, together with the extensive disorganization which induced pneumo-thorax, etc., was in itself of fatal augury. But when to this is superadded the most complete prostration, derangement of the digestive system, and extensive degeneration of the kidneys, with œdema of the lower extremities, it may well be supposed that the case admitted of nothing but palliatives. These were applied to the relief of the renal symptoms, and had partially succeeded when he left the house.

Case CXLIV.*—*Chronic Phthisis—Enlarged Liver—Albuminuria—Large Excavation in Left Lung—Cicatrices and Induration of Right Lung—Waxy Liver and Kidneys—Tubercular Ulceration of Intestines.*

History.—Margaret Clark, æt. 39—admitted November 12th, 1844. She says that for two years previous to admission she has been labouring under frequent attacks of cough, with profuse expectoration and spitting of blood. During this period she has become greatly emaciated and very weak, sweating at night, with occasional diarrhœa. Catamenia have been absent during the last three months.

Symptoms on Admission.—There is frequent prolonged cough with copious purulent expectoration, often causing vomiting. Marked dulness on left side of chest, with loud cracked-pot resonance, and flattening of ribs under the clavicle. Under right clavicle dulness also evident, but resonance good over the rest of the lung. On auscultation over left side, loud gurgling is audible, with pectoriloquy, extending over the whole anterior surface, but diminishing somewhat towards the base. Under right clavicle there is loud mucous rale on inspiration, with bronchophony. Breath sounds inferiorly normal. Posteriorly, the physical signs are similar to those in front. There is considerable dyspnœa on exertion. Heart sounds normal. Pulse 110, feeble. Total loss of appetite with anorexia and vomiting after taking food. Tongue slightly furred. No diarrhœa at present, but says she is very subject to attacks of it. Body greatly emaciated, and copious sweating at night. Other functions normal. ℞ *Napthæ Medicin.* ʒj ; *Tr. Card. comp.* ℥j ; *Mist. Camph.* ℥v. M. *A sixth part to be taken three times a-day. Milk mixed with an equal part of lime water, and strong beef tea with toast, to be taken frequently in small quantities.*

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* Reported by Mr. Burn Murdoch, Clinical Clerk.

Progress of the Case.—*April* 16*th.*—From the time of her admission until now the physical signs have remained the same, with the exception that the moist rattles at the apex of right lung have gradually diminished, and have now nearly disappeared. At each catamenial period there has been considerable hæmoptysis, continuing several days, and amounting often to several ounces per day. Shortly after admission the appetite improved, she took nutrients with ℥iij of wine, and two and sometimes three table-spoonfuls of cod-liver oil daily. From time to time the latter remedy was suspended, and bitter vegetable infusions and tinctures administered, occasionally mixed with chalybeates. Every now and then an attack of diarrhœa has come on, which was restrained by chalk mixture and astringents. Hence she has been alternately better and worse as to symptoms, but at present she is decidedly better than when she entered the house. *July* 7*th.*—Since last report the liver has been observed to have gradually enlarged. It can now be felt extending below the level of the umbilicus on the right side, presenting a rounded margin and forming a distinct abdominal tumour. The emaciation is extreme, and latterly there has been considerable vomiting and diarrhœa. There is a hectic flush on the cheeks. The skin is warm ; pulse 120, feeble ; profuse sweating at night ; loud gurgling rales still audible on left side of chest, with cracked-pot sound on percussion, and pectoriloquy. On right side there is loud vocal resonance under clavicle, slight dulness on percussion, and dry cavernous or hoarse tubular breathing. Cough still troublesome, especially at night. Sputum purulent and copious, occasionally tinged with blood. For the last few days has passed little urine, which is albuminous, and the feet are slightly œdematous. *To have* ℥ij *of Gin instead of Wine.* ℞ *Sp. Æther. Nit.* ℥ss ; *Tr. Digitalis* ʒij ; *Mist. Scillæ.* c. *ad.* ℥vj. M. *One table-spoonful to be taken three times a-day. July* 24*th*—Urine still highly albuminous and scanty, though diuretics have been freely given, including supertartrate of potass. Liver now much larger, and extends down to Poupart's ligament when she sits up. Œdema has extended above the knee. Weakness has increased. *August* 16*th.*—Has continued in the same exhausted condition, every care having been taken to support her strength by small quantities of nutritious food. She has experienced little pain, and latterly obtained sleep at night by æther and morphia draughts. At 4 a. m. this morning, respiration became very difficult, and shortly after she died.

Sectio Cadaveris.—Thirty-one hours after death.

Body greatly emaciated.

Thorax.—Both pleuræ strongly adherent throughout by chronic adhesions. Apices of both lungs much puckered externally. The whole of the superior lobe of left lung hollowed out so as to form a cavern the size of a large cocoa-nut, containing fœtid air and about four ounces of dirty pus. Its walls were lined by a distinct pyogenic membrane, and consisted externally only of thickened pleura, and internally of a layer of indurated lung about half an inch in thickness. In the inferior lobe were several masses of infiltrated tubercle, which in some places were softened, forming small purulent collections, varying in size from a pea to that of a hazel nut. Throughout the upper lobe of right lung there were a few excavations, quite dry, varying in size from a millet seed to that of a small nut. The parenchyma between these was much indurated by chronic pneumonia, and of an iron-grey colour from pigmentary deposits. At the apex were several cretaceous concretions about the size of peas. One of these was the size of an almond nut, and elongated in form, and all were enclosed in indurated capsules. The two inferior lobes were emphysematous anteriorly. In the centre of the lowest one was an indurated white patch, the size of half-a-crown, with radii stretching from it in all directions. On cutting through it, it was seen to consist externally of dense white fibrous tissue, an eighth of an inch in thickness, and immediately below it was a mass of indurated tubercle, the size of a hazel nut, of iron-grey colour, containing gritty points of cretaceous matter. Other similar masses of varying size, but widely scattered, gave a nodulated feel to the two inferior lobes on this side. Heart healthy.

ABDOMEN.—The *liver* was not only enlarged, but altered greatly in shape. The right lobe was so elongated as to extend down to the crest of the ilium. The length from above downwards was 12 inches; breadth 8 inches. Length of left lobe was 8 inches; breadth, 5 inches. Its entire weight was 7 lbs. 9 oz. The greatest thickness of the organ from behind forwards was four inches. In texture it was of waxy consistence and appearance, of a dirty yellow colour, dense feel, smooth section, presenting semi-translucent edges. The *spleen* weighed 7 oz. 5 dr., and was healthy. The mucous membrane of the cœcum was of a black tint, which extended up the ascending and half way across the transverse colon, gradually diminishing in intensity. This discoloured portion of the membrane was studded over with chronic tubercular ulcers in various stages of healing, mingled with numerous cicatrices and puckerings. The largest of the open ulcers were the size of a shilling, with irregular raised edges, and dirty yellowish base. *Mesenteric glands* everywhere enlarged, of a white colour and indurated; some contained tubercular deposits. Both *kidneys* waxy; externally pale, indurated, and rough; internally, cortical substance atrophied, pale, and on section having translucent edges. The *uterus* contained in its inferior wall a fibrous tumour the size of a walnut. Three others the size of peas were on its anterior surface; *ovaries* contracted, rugose and of semi-cartilaginous consistence. Other organs healthy.

MICROSCOPIC EXAMINATION.—The tubercle everywhere presented its usual characters. The cells of the liver had undergone a remarkable change, being colourless, refracting light, deprived of nuclei, and forming, when compressed together, a translucent, amorphous mass. The black matter in the cœcum was composed of molecules and irregular masses of black pigment.

Commentary.—This case of chronic phthisis, which we watched for nine months, appeared to be on the point of death when she entered the Infirmary. The prostration was extreme, and an enormous excavation even then existed in the left, with smaller ones in the right lung. Careful treatment directed to restore the tone of the stomach, nutrients administered in small quantities, with wine and cod-liver oil, caused a gradual restoration, and my opinion is, that from that time the pulmonary disease continued to diminish. The cavities on the right side became dry, cicatrices and cretaceous transformations of the tubercular matter proceeded, and the large excavation on the left side became smaller and more circumscribed. The liver first, and then the kidneys, next underwent the waxy transformation; œdema came on, and she sunk. I have already alluded to the peculiar character of this degeneration of the liver and kidney (p. 222). It is exceedingly common in phthisical cases, and in this instance was recognised and examined histologically with great care in 1845. Formerly it was confounded with fatty degeneration, and it has been supposed that cod-liver oil tends to its production. But a knowledge of the true nature of the waxy degeneration must negative such a supposition, as the liver is altogether free from fat. The interruption to the portal and venal circulations, and the diminished flow of urine, produced more or less anasarca, a complication which sooner or later is uniformly fatal.

The foregoing series of cases illustrate tolerably well the advantages which attend what may be denominated a curative, as distinguished from a palliative, treatment of phthisis. It is exceedingly rare, however, that we can demonstrate among hospital cases a complete cure of the disease in its advanced stage, such as took place in Barclay. (Case CXXXVIII.) In the majority of instances, no sooner is amendment effected, than they insist on going out. A few return with the disease advanced, again get better, and so on, until at length they die. Many others I am satisfied get permanently well. In private cases, however, recovery is much more frequently observed; and now that physical diagnosis has enabled us with great certainty to recognise the disease and follow its progress, we can have no doubt of the superior advantages of a curative over a palliative practice. To carry out the former, however, upon correct principles, it is proper to have a knowledge—1st, Of the curability of the disease; 2d, Of its pathology and general treatment; and 3d, Of the special treatment, in reference to symptoms and complications. It may be well to make a few observations on each of these heads.

I.—*On the Curability of Phthisis Pulmonalis.*

Up to a very recent period, the general opinion has been, that phthisis pulmonalis almost always marches on to a fatal termination; and that the cases of its arrestment, which were known to have occurred, were so few, as merely to constitute an exception, which proved the rule. Morbid anatomy has now, I think, demonstrated, that tubercles in an early stage degenerate and become abortive with extreme frequency. In 1845, I made a series of observations with reference to the cretaceous masses and puckerings so frequently observed at the apices of the lungs in persons advanced in life. The conclusion arrived at was, that the spontaneous arrestment of tubercle in its early stage occurred in the proportion of from one-third to one-half of all the individuals who die after the age of forty. The observations of Rogée and Boudet, made at the Salpetrière Hospital in Paris, amongst individuals generally above the age of seventy, showed the proportion in such persons to be respectively one-half and four-fifths.

That the cretaceous and calcareous concretions, accompanied with puckerings, are really evidences of abortive tubercles, is established by the following facts:—

1. A form of indurated and circumscribed tubercle is frequently met with, gritty to the feel, which, on being dried, closely resembles cretaceous concretions.

2. These concretions are found exactly in the same situations as tubercle. Thus they are most common in the apex, and in both lungs. They frequently occur in the bronchial, mesenteric, and other lymphatic glands, and in the psoas muscles, or other textures which have been the seat of tubercular depositions, or scrofulous abscesses.

3. When a lung is the seat of tubercular infiltration throughout, whilst recent tubercle occupies the inferior portion, and older tubercle, and perhaps caverns, the superior, the cretaceous and calcareous concretions will be found at the apex.

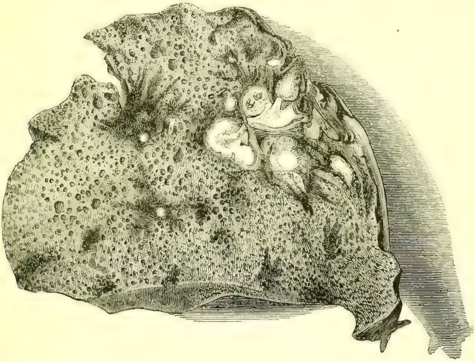

Fig. 402.

4. A comparison of the opposite lungs will frequently show, that whilst on one side there is firm encysted tubercle, partly transformed into cretaceous matter, on the other the transformation is perfect, and has occasionally even passed into a calcareous substance of stony hardness.

5. The seat of cicatrices admits of the same exceptions as the seat of tubercles. In one case, I have found the puckering and cicatrix in the inferior lobe only; and have met with three cases where the

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Fig. 402. Section of the summit of the right lung, exhibiting the cretaceous masses, more or less loaded with and surrounded by carbonaceous deposit. Many air vesicles are enlarged, constituting incipient emphysema. The preparation now in my possession exhibits a characteristic specimen of the mode in which a considerable amount of tubercular exudation is arrested by calcareous degeneration. *Natural size.*

inferior lobe was throughout densely infiltrated with tubercle, whilst he superior was only slightly affected.

It has indeed been argued, that occasionally these cretaceous masses may be the result of a simple exudation. When they are found isolated in the middle or base of the organ, such certainly may be the case, and consequently the fifth argument may be affected. But this is rare, and can scarcely make any alteration in the vast proportion of those concretions and puckerings which are undoubtedly the result of abortive tubercles. With these facts before us, and with the knowledge that there is nothing in the nature of tubercle itself which is opposed to the evidence of these anatomical facts, the frequent spontaneous cure of tubercle may now be considered established.

Since these observations, however, have become known, it has been stated that after all, practically speaking, phthisis pulmonalis does not mean the existence of a few isolated tubercles scattered through the lung, and that what is really meant, is that advanced stage in which the lung is affected with ulceration, and in which the bodily powers are so lowered that perfect recovery seldom or never takes place. But here again a careful examination of the records of medicine will show that many even of these advanced cases have recovered. Laennec, Andral, Cruveilhier, Kingston, Pressat, Rogée, Boudet, and others, have published cases where all the functional symptoms and physical signs of the disease, even in its most advanced stage, were present, and yet where the individual survived many years, ultimately died of some other disorder, and on dissection cicatrices and concretions have been found in the lungs.

I here show you a preparation, exhibiting a remarkable cicatrix in the lung, which I described and figured in the "Monthly Journal" for March 1850. As it is short, I may quote it:—

CASE CXLV. — *Advanced Phthisis — Restoration to Health — Death many years afterwards from Delirium Tremens — On Dissection, a Cicatrix, Three Inches long, in Apex of Right Lung, and Cretaceous Concretions, with puckering at the Summit of Left Lung.*

"John Keith, æt. 50, a teacher of languages, was admitted into the Royal Infirmary, February 8, 1844, in a state of coma, and died an hour afterwards. On examination, the membranes of the brain, at the base, were unusually congested, and covered with a considerable exudation of recently coagulated lymph, here and there mingled with bloody extravasation. The apex of the right lung presented a remarkable cicatrix, consisting of dense white fibrous tissue, varying in breadth from one-fourth to three-fourths of an inch, and measuring about three inches in length. The pleural surface in its neighbourhood was considerably puckered. On making a section through the lung, parallel with the external cicatrix, the substance immediately below presented linear indurations, of a black colour, together with five cretaceous concretions, varying in size from a pin's head to that of a large pea. The surrounding pulmonary substance was healthy. (Fig. 403.) The apex of the left lung was also strongly puckered, and contained six or seven cretaceous concretions, each surrounded by a black, dense, fibrous cyst.

"A very respectable-looking and intelligent man, who attended the post-mortem examination, informed me that Keith, in early life, was in very indifferent circumstances, and had supported himself as a writer. At the age of two-and-twenty, or three-and-twenty, he laboured under all the symptoms of a deep decline, and his life was despaired of. About this time, however, he was lost sight of by his friends; but it was afterwards ascertained that he had become a parish schoolmaster in the west of Scotland, and that his health had been re-established. He returned to Edinburgh six years before his death, and endeavoured to gain a livelihood by teaching Latin and French. He succeeded but very imperfectly, and fell into dissipated habits. Latterly he had become subject to attacks of mania, apparently

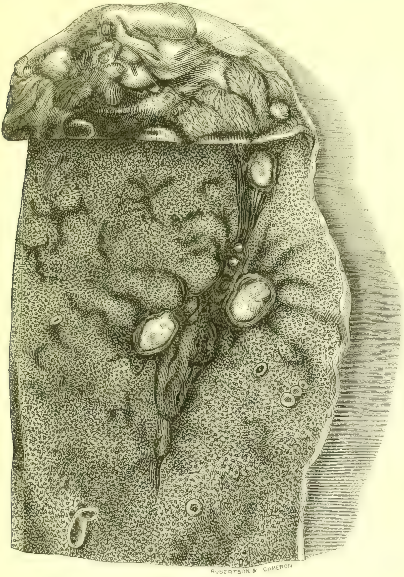

Fig. 403.

Fig. 403. The section of the upper portion of lung in Keith's case seen from within, the apex having been left entire to show the deep puckerings which covered its surface. The line of the healed cavity is densely loaded with black carbonaceous deposit, in which are seen five cretaceous concretions, three of them encysted. This preparation, now in my possession, is perhaps a unique specimen, proving the healing by cicatrisation, of an enormous tubercular excavation in the lung. *Natural size.*

the result of drink. It was after an unusually severe attack of this kind that he was brought into the Infirmary, where he died in the manner previously described."

This case points out the following important facts,—1st, That at the age of twenty-two or twenty-three the patient had a tubercular ulcer in the right lung, the size of which must have been very considerable when the contracted cicatrix alone was three inches long. 2d, That tubercular exudations existed in the apex of the left lung. It is, therefore, very probable that the statement made by his friend at the examination was correct—namely, that he laboured under all the symptoms of advanced phthisis pulmonalis. It is shown, 3dly, That after receiving the appointment of a parish schoolmaster, after changing his residence and occupation, while his social condition was greatly improved, these symptoms disappeared. We may consequently infer, that it was about this period that the excavation on the right side healed and cicatrized, while the tubercular exudations on the left side were converted into cretaceous masses, and so rendered abortive. It demonstates, 4thly, That when, at a more advanced age, he again fell into bad circumstances, and even became a drunkard, tubercular exudations did not return, but that delirium tremens was induced, with simple exudation on the membranes of the brain, of which he died.

Although the curability of phthisis pulmonalis, even in its most advanced stage, can now no longer be denied, it has been argued that this is entirely owing to the operations of nature, and that the physician can lay little claim to the result. Andral, who early admitted the occasional cicatrization of caverns, states this in the following words:—"No fact," he says, "demonstrates that phthisis has been ever cured, for it is not art which operates in the cicatrization of caverns; it can only favour this, at most, by not opposing the operations of nature. For ages remedies have been sought either to combat the disposition to tubercles, or to destroy them when formed, and thus innumerable specifics have been employed and abandoned in turn, and chosen from every class of medicaments."* But if it be true, according to Hoffman, that "*Medicus naturæ minister non magister est*," it follows that by carefully observing the operations of nature, learning her method of cure, imitating it as closely as possible, avoiding what she points out to be injurious, and furnishing what she evidently requires, that we may at length arrive at rational indications of treatment. Both the cases of Keith and Barclay, in my opinion, furnish evidence that we have in a great measure attained this end; and this leads me to speak, in the second place, of

II.—*The Pathology and General Treatment of Phthisis Pulmonalis.*

Many observing physicians have not failed to notice, that phthisis pulmonalis is ushered in with a bad and capricious appetite, a furred or morbidly clean tongue, unusual acidity of the stomach and alimentary canal, anorexia, constipation alternating with diarrhœa, and a variety of symptoms denominated dyspeptic, or referable to a deranged state of the primæ viæ. Moreover, it can scarcely be denied that, in the great majority of cases, these are the symptoms which accompany phthisis throughout its progress, becoming more and more violent towards its termination. Now, as the nutritive properties of the blood are entirely dependent on a proper assimilation of food, and as this assimilation must be interfered with in the morbid conditions of the alimentary canal, the continuance of such conditions necessarily induces an impoverished state of that fluid, and imperfect growth of the tissues. Moreover, when, under such circumstances, exudations occur, it has been shown by the histologist that they do not exhibit any tendency to perfect cell formations, but that corpuscles are produced, which form slowly, and slowly break down, causing softening, and the production of ulceration, which becomes more and more extensive as the amount of the exudation increases.

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* Dict. de Med. 1st Edit. Phthisie.

An observation of the circumstances which precede the disease, or its so-called causes, clearly indicates imperfect digestion and assimilation as its true origin. Thus phthisis is essentially a disorder of childhood and youth—that is, a period of life when nutrition is directed to building up the tissues of the body. Diminish the proper quantity of food taken by a healthy adult, and tubercular diseases are not induced; but if this be attempted with children or young persons, they are a most common result. It has been supposed that hereditary predisposition, a vitiated atmosphere, changeable temperature, certain occupations, humidity, particular localities, absence of light, and so on, predispose to phthisis. Very frequently several of these are found united, so that it is difficult to ascertain the influence of each. When they so operate, however, they invariably produce, in the first place, more or less disorder of the nutritive functions, and are associated with dyspepsia, or other signs of mal-assimilation of food.

From a study of the symptoms, causes, morbid anatomy, and histology of phthisis pulmonalis, we are therefore led to the conclusion, that it is a disease of the primary digestion, causing,—1st, Impoverishment of the blood; 2d, Local exudations into the lung, which present the characters of tubercular exudation; and, 3d, Owing to the successive formation and softening of these, and the ulcerations which follow, in the pulmonary or other tissues, the destructive results which distinguish it. Further observation shows, that circumstances which remove the mal-assimilation of food frequently check further tubercular exudations, while those which previously existed become abortive, and that occasionally more extensive excavations in the pulmonary tissue may, owing to like circumstances, heal up and cicatrize. The curative treatment of this disease must therefore be directed,—1st, To restoring the healthy nutrition of the economy; 2d, To subduing local irritation; and 3d, To the avoidance of those circumstances likely to deteriorate the constitution on the one hand, or induce pulmonary symptoms on the other.

1. A healthy nutrition of the body cannot proceed without a proper admixture of mineral, albuminous, and oleaginous elements. This may be inferred from the physiological experiments of Tiedemann and Gmelin, Leuret and Lassaigne, Magendie, and others; from an observation of the constituents of milk, the natural food of young mammiferous animals; from a knowledge of the contents of the egg, which constitute the source from which the tissues of oviparous animals are formed before the shell is broken; and from all that we know of the principles contained in the food of adult animals. The researches of chemists, such as those of Prout, Liebig, and others, point to the same generalisation, when they assert that carbonised and nitrogenised, or, as they have been called, respiratory and sanguigenous food, are necessary to carry on nutrition, inasmuch as oil is a type of the one, and albumen of the other. The chemical theory is imperfect, however, because it does not point *how* these elements form the tissues; for it is not every form of carbonised or of albuminous food that is nutritious, but only such kinds of them as are convertible into oil and albumen.

The reason of this was first pointed out by Dr. Ascherson of Berlin, in 1840, and made known by me to the profession in this country in 1841. I have since endeavoured to show, that the elementary molecules formed of a particle of oil, surrounded by a layer of albumen, which are produced, as he described, by rubbing oil and albumen together, are not developed directly into blood-globules and other tissues, as he supposed, but must first pass through a series of transformations—a knowledge of which is highly important, not only to a comprehension of nutrition generally, but especially to that abnormal condition of it which occurs in phthisis. Thus the successive changes which occur for the purposes of assimilation in the healthy economy may be shortly enumerated as follows:—1st, Introduction into the stomach and alimentary canal of organic matter. 2d, Its transformation by the process of digestion into albuminous and oily compounds: this process is chemical. 3d, The imbibition of these through the mucous membrane in a fluid state, and their union in the termini of the villi and lacteals to form elementary granules and nuclei: this process is physical. 4th, The transformation of these, first, into chyle corpuscles, and, secondly, into those of blood: which is a vital process. It is from this fluid, still further elaborated in numerous ways, that the nutritive materials of the tissues are derived, so that it must be evident, if the first steps of the process are improperly performed, the subsequent ones must also be interfered with. Hence we can readily comprehend how an improper quantity or quality of food, by diminishing the number of the elementary nutritive molecules, must impede nutrition.

When we examine with a magnifying power of 250 diameters a drop of chyle taken from the thoracic duct of an animal, three hours after it has eaten a meal, we observe that it contains, first, a molecular basis (Gulliver) of incalculably minute particles; and secondly, numerous corpuscles in different stages of development into blood globules. This molecular basis has been proved by numerous chemical analyses to consist principally of fat, emulsionised by its admixture with albumen. In short, these two important principles, fat and albumen, constitute essential elements of the nutritive chyme; and the former divided into exceedingly minute particles by the latter, pass through the villi and form the milky fluid called chyle. It is unnecessary for me to trace the subsequent changes this chyle undergoes by its passage through the mesenteric glands, and the successive stages of elaboration produced in it by the operation of the blood glands and the lungs. No one can doubt that the oil and albumen so derived from the food, and so altered chemically and mechanically in the body, constitute the material from which blood is formed; neither can there be any question that the presence and emulsionising of these elements in proper proportions, are absolutely necessary to supply and keep up the vital properties of the blood.

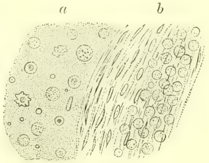

Fig. 404.

The peculiarity of phthisis, however, is, that an excess of acidity exists in the alimentary canal, whereby the albuminous constituents of the food are rendered easily soluble, whilst the alkaline secretions of the saliva and of the pancreatic juice are more than neutralized, and rendered incapable either of transforming the carbonaceous constituents of vegetable food into oil, or of so preparing fatty matters introduced into the system, as will render them easily assimilable. Hence an increased amount of albumen enters the blood, and has been found to exist there by all chemical analysts, while fat is largely supplied by the absorption of the adipose tissues of the body, causing the emaciation which characterises the disease. In the meanwhile, the lungs become especially liable to local congestions, leading to exudation of an albuminous kind: which is tubercle. This, in its turn, being deficient in the necessary proportion of fatty matter, elementary molecules are not formed so as to constitute nuclei capable of further development into cells; they therefore remain abortive, and constitute tubercle corpuscles. Thus a local disease is added to the constitutional disorder, and that compound affection is induced which we call phthisis pulmonalis, consisting of symptoms attributable partly to the alimentary canal, and partly to the pulmonary organs.

Fig. 404. Chyle from the thoracic duct of a dog, three hours after eating a meal. *a*, Fluid chyle showing its molecular basis and corpuscles in various stages of development into those of blood. *b*, Corpuscles of chyle embedded in fibrilated fibrin. They are round in the centre, but more or less compressed and elongated towards the margin. 250 *diam.*

To improve the faulty nutrition which originates and keeps up the disease, it is of all things important, therefore, to cause a larger quantity of fatty matter to be assimilated. A mere increase in the amount, or even quality, of the food, will often accomplish this, as in the case of Keith. The treatment practised some years ago by Dr. Stewart of Erskine, which consisted in freely administering beef-steaks and porter, and causing exercise to be taken in the open air, excited considerable attention from its success. I have been informed, that in some parts of America the cure consists in living on the bone marrow of the buffalo, and that the consumptive patient gets so strong in this way, that he is at length able to hunt down the animal on the prairies. All kinds of food rich in fat, will not unfrequently produce the same effects, and hence the value long attributed to milk, especially ass's milk, the produce of the dairy, as cream and butter, fat bacon, caviar, etc.

But in order that such substances should be digested and assimilated, the powers of the stomach and alimentary canal must not have undergone any great diminution. In most cases it will be found that the patient is unable to tolerate such kind of food, and that it either lies undigested in the stomach, or is sooner or later vomited. Under these circumstances, the animal oils themselves are directly indicated, by giving which, we save the digestive apparatus, as it were, the trouble of manufacturing or separating them from the food. By giving considerable quantities of oil directly, a large proportion of it is at once assimilated, and is rendered capable of entering into combination with the albumen, and thereby forming those elementary molecules so necessary for the formation of a healthy chyle. Such, it appears to me, is the rationale of the good effects of cod-liver oil.

Since I introduced this substance to the notice of the profession in this country as a remedy for phthisis, in 1841, I have continually prescribed it in hospital, dispensary, and private practice. I need not perhaps say, that I have given it in a very large number of cases, and have observed its effects in all the stages of the disease, and under almost every circumstance of age, sex, and condition. I have had the most extensive opportunities of examining the bodies of those who have died after taking it in considerable quantities, and am still observing the cases of many persons who may be said to have owed their lives to its employment. Further, I have carefully watched the progress it has made in the good opinion of the professional public, and perused all that has been published regarding it in the literature of this and other countries. It were certainly easy for me, therefore, to write at great length on this subject; but I do not see that anything of utility could be added to what I have already published. The following is a summary of my views regarding cod-liver oil as a remedy for phthisis :—

1. Cod-liver oil is, as M. Taufflied pointed out, an *analeptic* (*ἀναλαμβάνω*, to repair), and is indicated in all cases of abnormal nutrition dependent on want of assimilation of fatty matter.

2. It is readily digestible under circumstances where no other kind of animal food can be taken in sufficient quantity to furnish the tissues with a proper amount of fatty material.

3. It operates by combining with the excess of albuminous constituents of the chyme, and forming in the villi and terminal lacteals those elementary molecules of which the chyle is originally composed.

4. Its effects in phthisis are to nourish the body, which increases in bulk and in vigour ; to check fresh exudations of tubercular matter, and to diminish the cough, expectoration, and perspiration.

5. The common dose for an adult is a table-spoonful three times a-day, which may often be increased to four, or even six, with advantage. When the stomach is irritable, however, the dose to commence with should be a tea or dessert-spoonful.

6. The kind of oil is of little importance therapeutically. The pure kinds are most agreeable to the palate ; but the brown coarser kinds have long been used with advantage, and may still be employed with confidence whenever cheapness is an object.

7. I have never observed its employment to induce pneumonia, or fatty disease of the liver or kidney, however long continued, although such complications of phthisis are also exceedingly frequent.

But in some rare cases the oil cannot, even under the best management, be retained on the stomach, and efforts have been made to introduce fat into the economy by some other channel, such as by the skin and rectum. The former plan was first tried by Dr. Baur of Tubingen, who rubbed various kinds of oil into the skin, and even recommended oil baths. Persons occasionally got better under this as they do under every other kind of treatment, but the excessive trouble, and sense of uncleanliness greasy frictions occasion, are strong objections to its use. Its costliness also renders it inapplicable to the poor. Oily enemata were recommended by Dr. Buist of Aberdeen. But it must be evident that as nature never intended mankind to be permanently nourished either by the skin or by the rectum, so, in imitation of her processes, the object of an analeptic treatment in pulmonary tuberculosis must be to cause the elements of the food to be taken by the mouth ; to diminish the dyspeptic symptoms and induce assimilation by the lacteal rather than by the lymphatic vessels.

2. The second indication—namely, to subdue local irritation—is only to be followed out in acute cases by much the same practice as guides us in the treatment of pneumonia, which is the general cause of such irritation. From what has been previously said on that subject, it must be evident, that however practitioners may flatter themselves that by bleeding or mercury they have checked inflammation, these remedies in phthisis, so far from arresting the local lesion, have only accelerated it.

In the chronic forms of the disease this indication is only to be met by topical counter-irritation. Hence a seton or issue, a succession of blisters, tartar emetic ointment, and croton oil, are all beneficial, and may be used according to circumstances. Cold sponging, employed with great precaution, so as not to produce a chill, but rather a glow of heat afterwards, is also beneficial. Such are the only means in our power to meet this important indication, because, combined with this local lowering treatment, the general system must be invigorated to the utmost. This is the difficult problem to be worked out in the treatment of phthisis, and in doing so we shall be much assisted by paying particular attention to the third indication.

3. The avoidance of those circumstances likely to deteriorate the constitution on the one hand, or induce pulmonary symptoms on the other, offers a wide field for the judicious practitioner, especially in his character of a watchful guardian over his patient's health. One of the great difficulties we have to overcome in this climate, is the frequent variations of temperature, and the sudden changes from fervent heat to chilling cold. Supposing that you have the means of supporting nutrition and keeping down local irritation, it is by no means certain that good will be accomplished, from the impossibility of securing those hygienic regulations and that equable climate, which are necessary to carry out the third indication. In the first place, nutrition itself is more connected with proper exercise and breathing fresh air than many people imagine. It does not merely consist in stimulating the appetite and giving good things to eat. It requires—1st, Food in proper quantity and quality; 2d, Proper digestion; 3d, Healthy formation of blood; 4th, A certain exchange between the blood and the external air on the one hand, and between the blood and the tissues on the other; and 5th, It requires that there should be proper excretion, that is, separation of what has performed its allotted function and become useless. *All* these processes are necessary for nutrition, and not one or more of them, for they are all essentially connected with, and dependent on, one another. Hence the means of prevention consist in carrying out those hygienic regulations which secure the performance of these different nutritive .acts, the most important of which are attention to climate, exercise, and diet.

Much has been written on climate, but the one which appears to me best is that which will enable the phthisical patient to pass a few hours every day in the open air, without exposure to cold or vicissitudes of temperature on the one hand, or excessive heat on the other. Whenever such a favoured locality may be found during the winter and spring months, its advantages should be considered as dependent on exercise, and on the stimulus given to the nutritive functions, rather than to its influence on the lungs directly.

The great mass of those affected with phthisis, however, have not the means of searching out a favourable climate on the Continent, or even of maintaining themselves in a sheltered nook on the western or south-western coasts of this country. It has, therefore, been proposed that such buildings as the Crystal Palace should be converted into winter gardens and public promenades. Not to speak of the intellectual and recreative purposes that such a plan would subserve, it is worthy of our consideration how far it would tend to promote health in general, but especially, how it would conduce to the cure of phthisis. Its great advantage would be offering the means of exercise in a pure atmosphere, at an equable temperature. It is easy for us, by confining patients in a suite of rooms in which the heat is regulated, to secure immunity from cold and change of air; but such a contrivance is most intolerable to the patient; the mind becomes peevish, which in itself is a powerful obstacle to the proper performance of the digestive functions. But above all, the body is deprived of exercise—that necessary stimulus to the appetite, respiration, and other functions. Some years ago, I succeeded in confining a consumptive patient to his room for an entire winter. His spirits suffered greatly; but on the whole he supported the imprisonment with resolution. Next winter, however, nothing could induce him to remain at home, and one day he rushed out of the house, ascended Arthur's Seat, and was much better in consequence. Since then I have been convinced that, although by confinement you may gain some advantages, on the whole it is a prejudicial practice if rigorously carried out.

What is required in these cases is the means of exercise, whether on foot, on horseback, or in a carriage, where the patient is protected from cold winds, and where the mind can be amused by pleasant sights and cheerful conversation. Such is the case in all those favoured localities considered best for consumptive people, and such would be the advantages derived from resorting to the Crystal Palace as a winter garden and promenade. Delicate individuals could be transported there by means of a close carriage, in the worst seasons, without difficulty, and on entering it could breath for hours a pure, balmy air, meet their friends, take exercise in various ways, read, work, or otherwise amuse themselves. Such an out-door means of recreation, combined with careful hygienic regulations at home, would go far to remove many of the difficulties which we have to encounter in the ordinary treatment of consumption.

With regard to diet, it may be said, in general terms, that one of a nutritious kind, consisting of a good proportion of animal food abounding in fat, is best adapted for phthisical cases, whilst everything that induces acidity should be avoided. But, as previously stated, the difficulty consists in causing such diet to be taken, on account of the bad appetite and dyspeptic or febrile symptoms which prevail. No effort, therefore, should be spared to overcome the obstacles which prevent food of sufficient quality and quantity from being digested, the appropriate means for doing which must vary according to the circumstances of the case, and will be treated of immediately. The strongest stimulus to the appetite, however, is exercise, and hence the importance of the considerations already entered into, with reference to securing what is essential in the treatment of the disease, namely, good digestion and proper assimilation.

If the pathology of pulmonary tuberculosis formerly described be correct, it indicates what are the means best adapted for preventing, as well as arresting, the disease when it has already commenced. These are, for the infant, a healthy nurse, cleanliness, and careful attention to all those circumstances which tend to increase the bodily vigour and to secure good digestion. At the time of weaning and of teething, the most watchful care becomes necessary, so that local irritation and its effects may be prevented as much as possible, and a proper diet, containing a sufficient amount of the fatty principles, be taken. During adolescence, indulgence in indigestible articles of food should be avoided, especially pastry, unripe fruit, salted provisions, and acid drinks, while the habit of eating a certain quantity of fat should be encouraged, and, if necessary, rendered imperative. The same precautions, conjoined with proper bodily and mental exercise, avoiding exhausting and too fatiguing occupations, should subsequently be maintained until the predisposition to tubercular disease has been completely overcome. In short, everything that can support and invigorate should be adopted, and everything that can exhaust and depress should be shunned. As vitiation of the chyle and blood precedes the local deposition of a tubercular exudation, it necessarily follows that that numerous class of delicate invalids, whose chief complaint is derangement of the digestive process, with languor and debility, may, by the hygienic means now indicated, and proper treatment of the dyspepsia, be restored to health.

Were it possible in all cases for these three indications to be carried out, I feel satisfied the cure of phthisis would be more frequent; but in the treatment of this disease, the physician has to struggle not only with the deadly nature of the disorder, but with numerous difficulties over which he has no control, such as, among the poorer classes, the impossibility of procuring good diet, and the thousand imprudences not only they, but the majority of invalids, are continually committing. Then another great difficulty is, to convince the patient that, notwithstanding the removal of his urgent symptoms, the disease is not cured, and that these will return, if the causes which originally produced them are again allowed to operate. Sometimes I have found it difficult to keep hospital patients in the house when they are doing well, at other times they are sent out in accordance with certain regulations, which oblige the admission of more acute cases. This was the case with Barclay. (Case CXXXVIII.) So long as he was under treatment, or rather enjoyed the comforts and good diet of the Infirmary, so long was he well; but sent out, exposed to misery, to insufficient food, and work, he became worse. Lastly, the attempt to relieve distressing symptoms interferes much more than is generally supposed with the curative treatment. This leads me to speak of the

III.—*Special Treatment of Phthisis Pulmonalis.*

Under the head of General Treatment of Phthisis Pulmonalis, I have pointed out the means of meeting the three indications which should never be lost sight of in this disease. But every case requires a special treatment in addition, which will depend on the unusual severity of this or that symptom, or the existence of peculiar complications. It is to the undue importance given to this special, as distinguished from the general treatment, that I attribute much of that want of success experienced by practitioners. Thus it is by no means uncommon to meet with patients who are taking at the same time a mixture containing squills and ipecacuanha to relieve the cough; an anodyne draught to cause sleep and diminish irritability; a mixture containing catechu, gallic acid, tannin, or other astringents, to check diarrhœa; acetate of lead and opium pills to diminish hæmoptysis; sulphuric acid drops to relieve the sweating; and cod-liver oil in addition. I have seen many persons taking all these medicines and several others at one time, with a mass of bottles and boxes at the bedside sufficient to furnish an apothecary's shop, without its ever suggesting itself apparently to the practitioner, that the stomach drenched with so many nauseating things is thereby prevented from performing its healthy functions. In many cases there can be little doubt that this treatment of symptoms, with a view to their palliation, whilst it destroys all hope of cure, ultimately fails even to relieve the particular functional derangement to which it is directed. Still these symptoms require attention; but their causes, and the means required for their relief, will be best understood by speaking of each in succession.

Cough and Expectoration.—At first the cough in phthisis is dry and hacking. When tubercle softens or bronchitis is present, it becomes moist and more prolonged. When excavations exist, it is hollow and reverberating. In every case cough is a spasmodic action, occasioned by exciting the branches of pneumogastric nerves, and causing simultaneous reflex movements in the bronchial tubes and muscles of the chest. The expectoration following dry cough is at first scanty and muco-purulent, and afterwards copious and purulent. When it assumes the nummular form,—that is, occurs in viscid rounded masses, swimming in a fluid clear mucus, it is generally brought up from pulmonary excavations. The accumulation of the sputum in the bronchial tubes is an excitor of cough; and hence the latter symptom is often best combated by those means which diminish the amount of sputum. When, on the other hand, the cough is dry, those remedies should be used which diminish the sensibility of the nerves. In the first case, the amount of mucus and pus formed will materially depend on the weakness of the body and the onward progress of the tubercle. Hence good nourishment and attending to the digestive functions are the best means of checking both the cough and expectoration; whereas giving nauseating mixtures of ipecacuanha and squills is perhaps the worst treatment that can be employed. There is no point which experience has rendered me more certain of than that, however these symptoms may be palliated by cough and anodyne remedies, the stomach is thereby rendered intolerant of food, and the curative tendency of the disease impeded. On the other hand, nothing is more remarkable than the spontaneous cessation of the cough and expectoration on the restoration of the digestive functions and improvement in nutrition. When the cough is dry, as may occur in the first stage, with crude tubercle, and in the last stage, with dry cavities, counter-irritation is the best remedy, employed in various forms. Opium may relieve, but it never cures. The occasional use of the sponge saturated in a solution of nitrate of silver, is frequently of the greatest service. (See Laryngitis.)

Loss of Appetite and Anorexia.—These are the most constant and important symptoms of phthisis, inasmuch as they interfere more than any other with the nutrive processes. If food, or its substitute, cod-liver oil, cannot be taken and digested, it is vain to hope for amelioration in any of the essential symptoms of the disease. Here we should avoid a mistake, into which the inexperienced are very liable to fall. Nothing is more common than for phthisical patients to tell their medical attendants that their appetite is good, and that they eat plentifully, when more careful inquiry proves that the consumption of food is altogether inadequate, and that they loathe every kind of animal diet. In the same manner, they say they are quite well, or better, when they are evidently sinking. We should never be satisfied with general statements, but determine the kind and amount of food taken, when sufficient proof will be discovered, in the vast majority of cases, of the derangement of the appetite and digestive powers formerly alluded to. Very commonly also, there will be acid and other unpleasant tastes in the mouth. In all such cases, especially if too much medicine has been already given, the stomach should be allowed to repose itself before anything be administered, even cod-liver oil. Sweet milk, with toasted bread, and small portions of meat nicely cooked, so as to tempt the capricious appetite, should be tried. Then ten drops of the Sp. Ammon. Aromat., given every four hours in a wine-glassful of some bitter infusion, such as that of Columbo or Gentian, with a little Tr. Aurantii, Tr. Cardamomi, or other carminative. In this way the stomach often regains its tone, food is taken better, and then cod-liver oil may be tried, first in tea-spoonful doses, cautiously increased. Should this plan succeed, amelioration in the symptoms will be almost certainly observed.

Nausea and Vomiting.—Not unfrequently the stomach is still more deranged; there is a feeling of nausea and even vomiting on taking food. In the latter stages of phthisis, vomiting is also sometimes occasioned by violence of the cough, and the propagation of reflex actions, by means of the par vagum, to the stomach. In the former case, the sickness is to be alleviated by carefully avoiding all those substances which are likely to occasion a nauseating effect, by not overloading the stomach, but allowing it to have repose. In cases where too much medicine has been administered, a suspension of all medicaments for a few days will frequently enable the practitioner to introduce nourishment cautiously with the best effect. I have found the following mixture very effectual in checking the vomiting in phthisis. ℞ *Napthæ Medicinalis*, ʒj ; *Tr. Cardamomi comp.*, ℥j ; *Mist Camphoræ*, ℥vij. *M. ft. Mist.* Of which a sixth part may be taken every four hours. When it depends on the cough, those remedies advised for that symptom should be given. I have tried emetics for the relief of nausea and vomiting, but with no good result.

Diarrhœa.—This is a very common symptom throughout the whole progress of phthisis, at first depending on the excess of acidity in the alimentary canal, to which we have alluded, but in advanced cases connected with tubercular deposition and ulceration in the intestinal glands. The best method of checking this troublesome symptom, is by improving the quality and amount of the food. The moment the digestive processes are renovated, this, with the other functional derangements of the alimentary canal, will disappear. Hence at an early period we should avoid large doses of opium, gallic acid, tannin, and other powerful astringents, and depend upon the mildest remedies of this class, such as chalk with aromatic confection, or an antacid, such as a few grains of carbonate of potash. When, on the other hand, in advanced phthisis, continued diarrhœa appears, and is obstinate under such treatment, then it may be presumed that tubercular disease of the intestine is present, and the stronger astringents with opium may be given as palliatives.

Hæmoptysis.—This symptom sometimes appears suddenly in individuals in whom there has been no previous suspicion of phthisis, and in whom, on careful examination, no physical signs of the disease can be detected. On other occasions, the sputum may be more or less streaked with blood; and lastly, it may occur in the advanced stage of the disease, apparently from ulceration of a tolerably large vessel. In all these cases the best remedy is perfect quietude, and avoidance of every kind of excitement, bodily and mental. Astringents have been recommended, especially acetate of lead and opium; but how these remedies can operate, I am at a loss to understand; and I have never seen a case in which their administration was unequivocally useful. I have now met with several cases where supposed pulmonary hæmorrhage really originated in follicular disease of the pharynx or larynx, and which with the supposed phthisical symptoms was removed by the use of the probang and nitrate of silver solution.

Sweating I regard as a symptom of weakness, and therefore as a common, though by no means a special one in phthisis. Here, again, the truly curative treatment will consist in renovating the nutritive processes, and adding strength to the economy. It will always be observed, that, if cod-liver oil and good diet produce their beneficial effect, the sweating, together with the cough and expectoration, cease. On the other hand, giving acid drops to relieve this symptom, as is the common practice, by adding to the already acid state of the alimentary canal, is directly opposed to the digestion of the fatty principles, which require assimilation.

It should not be forgotten that consumptive patients, and all those suffering from pulmonary diseases, are especially sensitive to cold. The impeded transpiration from the lungs in such cases, is counterbalanced by increased action of the skin, which becomes unusually liable to the influence of diminished temperature. Again, cold applied to the surface immediately produces, by reflex action, spasmodic cough and excitation of the lungs. Every observant person must have noticed how cough is induced by crossing a lobby, going out into the open air, a draught of wind entering the room, getting into a cold bed, etc. etc. The mere exposure of the face to the air on a cold day, takes away the breath, induces cough, and obliges the patient instinctively to muffle up the mouth. The numerous precautions, therefore, that ought to be taken by the phthisical individual, should be pointed out, especially the necessity of warm clothing, to which large additions should be made on going out into the air. Thus, covering the lower part of the face is important as a means of extra clothing, and not as a means of breathing warm air, as the favourers of respirators imagine. The patient should always sit with his back to the horses or to a steam-engine, and if by accident his shoes or clothes become wet, they should be changed as soon as possible. In the house, ladies should have a shawl near them, to put on in going from one room to another, in descending a stair to dinner, etc. By attention to these minutiæ, much suffering and cough may be avoided.

Febrile Symptoms.—The quick pulse, general excitement, loss of appetite, and thirst, which are so common in the progress of phthisical cases, are dependent on the same causes which induce symptomatic fever in general. Vascular distension, resulting in exudation and its absorption, is proceeding with greater or less intensity in the lungs, and frequently in other organs. This leads to nervous irritation and increase of fibrin in the blood, accompanied by febrile phenomena. The intensity of these is always in proportion to the activity of local disease, or to the amount of secondary absorption going on from the tissues, or from morbid deposits. Nothing is more common than attacks of so-called local inflammations in phthisis, and the careful physician may often determine by physical signs the supervention of pleurisy, pneumonia, or bronchitis on the previously observed lesion, and not unfrequently laryngitis, enteritis, or other disorders. In such cases, nature herself dictates that the analeptic treatment, otherwise appropriate, is no longer applicable — food disgusts, and fluids are eagerly demanded. Under these circumstances, it has been common to apply leeches to the inflamed part, and extract blood by cupping, measures which undoubtedly cause temporary relief, but which are wholly opposed to the plan of general treatment formerly recommended, and to what we know of the pathology of the disease. Every attack of febrile excitement is followed by a corresponding collapse, and it should never be forgotten that in a disease which is essentially one of weakness, the patient's strength should be husbanded as much as possible. Hence the treatment I depend on in such circumstances, consists of at first the internal administration of the neutral salts, especially of tartar emetic in small doses, combined with diuretics, in order to favour crisis by the urine. Subsequently quinine is undoubtedly advantageous. I have satisfied myself that such attacks are not to be cut short by leeches or cupping, and although in many cases, as previously stated, temporary relief is produced, the exposure of the person, and unpleasant character of the applications, the trickling of blood, and wet sponges, as often irritate, and give rise to unnecessary risk. Still there may be cases where topical blood-letting, if it cannot be shown to advance the cure, cannot be proved to have done harm, but these cases of late years have, as far as my observation goes, been very few in number. In the rapidly febrile cases, or the so-called instances of acute phthisis, mercury has been recommended; but I have never seen it produce the slightest benefit.

Debility.—This is a very common symptom of phthisis from the first, and frequently leads the patient into indolence both of mind and body, a condition very unfavourable for stimulating the nutritive functions, upon the successful accomplishment of which its removal depends. It is to remove the weakness that tonics have been administered, but I have never seen quinine, bitter infusions, or even chalybeates, of much service alone, while the continual use of nauseous medicine disgusts the patient, and interferes with the functions of the stomach. Here again the great indication is to remove the dyspeptic symptoms, give cod-liver oil, an animal diet, and improve the appetite by gentle exercise and change of scene. Should the practitioner succeed in renovating the nutritive functions, it is often surprising how the strength increases, in itself a sufficient proof as to what ought to be the method of removing the debility. I have frequently seen patients who have been so weak that they could not sit up in bed without assistance, so strengthened by the analeptic treatment, that they have subsequently walked about and taken horse exercise without fatigue, and this after all the vegetable, mineral, and acid tonics have been tried in vain.

Despondency and Anxiety.—It is impossible for the careful practitioner to avoid noticing the injurious influence of depressing mental emotions on the progress of phthisis. Indeed the worst cases are those of individuals with mild, placid, and unimpassioned characters, who give way to the feelings of languor and debility which oppress them. Such persons are most amiable patients—they give no trouble—anything will do for them—they resign themselves to circumstances, and state that they are eating well and getting better up to the last.

These are cases of bad augury, and it is exceedingly difficult to inspire them with sufficient energy to take exercise, or to carry out those regulations which are absolutely essential to renovate the appetite or the nutritive functions. Such persons are benefited by slow travelling, cheerful society, and everything that can elevate the spirits, and, insensibly to themselves, communicate a stimulus to the mental and bodily powers. Anxiety, on the other hand, though it may sometimes depress and interfere with the digestive functions, is often a most useful adjunct to the physician. They who experience it are most careful of their health, sometimes indeed too much so, but if once satisfied of the benefit of any particular line of treatment, they pursue it with energy. These are cases of good augury, and most of the permanent cures I have witnessed have been in such persons—medical men, and others acquainted with the nature of their disease, who have exhibited resolution, and a noble fortitude, and have bravely struggled against local pain, general debility, and nervous fear.*

CANCER OF THE LUNG.

CASE CXLVI.†—*Cancer of the Lung, Thyroid Body, and Lymphatic Glands of the Neck—Bronchitis—Leucocythemia.*

HISTORY.—Margaret Stewart, a cook, æt. 60—admitted into the clinical ward July 16, 1851. For some years back she has been subject to a short dry cough, which has never been troublesome except after cooking a larger dinner than usual. With the exception of an attack of diarrhœa when the cholera was prevalent, she has been more or less constipated. Has never suffered from epistaxis or other form of hæmorrhage. Four weeks ago she first perceived a swelling in the neck, which, commencing in front, has gradually spread towards the right side. Latterly her breathing has become short and hurried ; her strength has decreased, and the cough has been accompanied by considerable expectoration.

SYMPTOMS ON ADMISSION.—On admission, the neck presents a prominent indurated swelling anteriorly, measuring about four inches in diameter, evidently owing to enlargement of the thyroid body. A chain of enlarged glands extends from the anterior swelling round the right side of the neck, a little beyond the ear. She complains of great weakness, constant sweating at night, and cough with copious frothy expectoration. The chest is everywhere resonant on percussion. There are loud sonorous and moist rales heard over the whole chest, especially posteriorly and inferiorly. The vocal resonance is also unusually loud, but equal on both sides. The tongue is furred, dark brown in the centre ; deglutition is difficult, apparently from pressure of the enlarged cervical glands. The appetite is bad, with an acid taste in the mouth. Other functions properly performed.

PROGRESS OF THE CASE.—She continued in this condition for several days, during which iodine and counter-irritants were applied to the neck, and expectorants and antispasmodics taken internally to relieve the cough. The dyspnœa, however, gradually increased ; deglutition became more difficult, and her strength diminished. On the *30th of July* the urine was ascertained to contain albumen, which had previously not existed. She died without a struggle, *August 5th.*

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* For numerous other facts and observations connected with the pathology and treatment of phthisis, see the Author's work on Pulmonary Tuberculosis. 8vo. Edinburgh.

† Reported by Mr. D. O. Hoile, Clinical Clerk.

Sectio Cadaveris.—Forty hours after death.

Neck.—On dissecting the integuments from the neck on the right side, a considerable number of glands, about the size of a barley-corn and small pea, were observed in clusters between the platysma myoides and the sterno-mastoid muscle. A hard tumour existed in front of the neck, stretching along the whole front of the trachea, and over the great vessels on either side beneath the sterno-mastoid muscles, and posteriorly on the right side, as far back as the transverse processes of the vertebræ, and down beneath the clavicle to the anterior surface of the first rib, where it was firmly adherent to the periosteum. A prolongation of the tumour, about the size of two walnuts, passed beneath the sternum at its upper end, being attached to its periosteum. This prolongation on section presented the outline of a congeries of enlarged lymphatic glands, having a white appearance, in some places soft, and even diffluent, and yielding on pressure a copious milky cancerous juice.

Thorax.—There were lax adhesions at various points on the pleuræ on both sides. The pleural cavities contained a little fluid on the right side, amounting to about five ounces. At the lower part of the left lung, and also at the back part of right lung, there was a small amount of recent membranous exudation. A multitude of small cancerous nodules were scattered throughout the whole of both lungs. Some were immediately below the pleuræ, and some in the substance of the organs. For the most part these masses were scattered pretty equally, being as numerous at the base as at the apex, and varying from the size of a millet seed to that of a small walnut. Some were of firm consistence, and others soft and friable, presenting various degrees of induration. They all on pressure yielded a copious milky juice. The mucous membrane of the bronchi was of a mahogany colour, and the tubes more or less filled with muco-purulent matter.

Abdomen.—Abdominal organs healthy.

Microscopic Examination.—The cancerous juice squeezed from the cervical glands, and the nodules scattered throughout the lungs, contained numerous cancer-cells, which it is unnecessary to describe minutely here. (See p. 139.) Associated with these were a considerable number of round colourless corpuscles, varying in diameter from the 150th to the 100th of a millimetre in diameter. An unusual number of these cells also existed in the blood, as was determined both before and after death. (See Leucocythemia.)

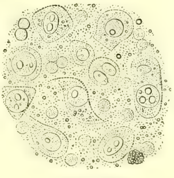

Fig. 405.

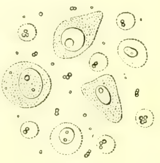

Fig. 406.

Commentary.—In the case before us, the chest was frequently examined with great care, and was ascertained to be everywhere resonant

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Fig. 405. Corpuscles in cancerous juice squeezed from the thyroid body.

Fig. 406. The same after the addition of acetic acid, showing the cancer cells, and those peculiar to the gland, which were found in large numbers in the blood. 250 *diam.*

on percussion. Loud sonorous and moist rales were heard on both sides, especially posteriorly and inferiorly. Hence there were all the signs of bronchitis, which was found afterwards to exist; but there was associated with them unusually loud vocal resonance, equal on both sides. It occurred to me at the time that this latter sign was merely indicative of diminished volume in the lungs; but, after the dissection, it became manifest that it was owing to increased density of the organs, from the disseminated cancerous nodules. Whether the conjoined signs of augmented or unusual resonance of the lungs, bronchitis and increased vocal resonance, will prove diagnostic in such cases, further experience only can determine. Doubtless, it will be always difficult to separate such signs, dependent on nodular cancer, from those connected with collapse of the lung, which is so common a result of chronic bronchitis. In the present case I was in great doubt, notwithstanding my acquaintance with the valuable sign of tumour in the neck, as pointed out by Dr. Kilgour of Aberdeen.*

The treatment, it must be obvious, can only be palliative.

Cancer of the lung may occur in two distinct forms,—1st, That of disseminated nodules; 2d, That of infiltrated masses. In the former case there are no physical signs, or functional symptoms, which indicate the presence of cancer; in the latter there are unusual dulness, and resistance on percussion, increased vocal resonance and tubular breathing, or diminished respiration, according to the density, position, and extent of the cancerous infiltration. If with these signs there be indications of the existence of cancer in other parts of the body, there will be little difficulty in forming the diagnosis; and even should this be absent, the history of the case, advanced period of life, and the non-existence of moist rattles will occasionally be sufficient. It must be confessed, however, that notwithstanding the valuable labours of Stokes, Hughes, M'Donnell, Walshe, and Kilgour, the means of diagnosing this lesion with certainty are very defective. In the present work, eight other cases are recorded in which cancer of the lung existed (Cases XXIX., XXXVI., XLVIII., LXIV., LXX., LXXV., LXXVI., and LXXXIII.) In one of these the pleuræ only were affected (Case LXXVI.) With the exception of Case XXXVI., in which the posterior surface of the lungs could not be examined, the pulmonary organs were carefully percussed and auscultated in all. But in none did any combination or succession of signs exist which could induce any one to pronounce that pulmonary cancer was present. Case LXXV. alone presented the gelatinous sputum tinged with blood, or the currant jelly expectoration described by Stokes. In Case XLVIII. there was ulceration and gangrene of the fungoid mass, with all the signs of pneumonia—and pneumonic condensation was found surrounding the epithelioma of the lung after death. In Case LXX. there was thoracic aneurism, to which all the physical signs were attributable. When infiltrated cancer exists to any amount in the apex of the lungs, associated with cancer in other organs, or with an evident tumour in the neck or mediastinum, the diagnosis is comparatively easy.

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* Monthly Journal of Medical Science, June 1850.

Nothing can be more variable than the minute structure of cancer in the lung. When recent, it may present delicate round or oval cells, (Fig. 112). When more advanced, it may exhibit large compound cells (Fig. 119) as in Case LXXV. When in the infiltrated form and softened to any extent, I have seen the whole reduced to a mass of irregularly formed nuclei, as in Fig. 307. On one occasion I found a large mass of brain-like looking cancer of the lung, somewhat fibrous, and principally composed of elongated fusiform corpuscles.

CARBONACEOUS LUNGS.

CASE CXLVII.*—*Carbonaceous Lungs with Black Expectoration.*

HISTORY.—Thomas Wilson, æt. 38, collier, from the Oakley Mines near Dunfermline, was admitted into the clinical ward 26th July 1851. He states that he has been employed about coal mines for the last twenty-four years, during the principal part of which he has been occupied in blasting rock for the sinking of pits, using large quantities of gunpowder daily. He is much exposed to cold and wet in this occupation, working almost constantly with wet feet, and frequently with the whole of his clothes drenched. During the laying open of a new surface for the working of coal, he has often worked in an atmosphere barely capable of supporting the combustion of the miners' lamps; he has observed this particularly when working iron-stone. Notwithstanding, it was only about seven months ago that he began to be troubled with short dry cough, and difficulty of breathing. He continued to work till about four months ago, when the cough became more severe; he had much dyspnœa, and frequent profuse perspiration, especially at night. Two weeks after this—that is, about fourteen weeks ago—he was laid up from work; and about the same time, while under treatment, he began to spit much, and observed that the expectoration was of a deep black colour. The change was so sudden as to alarm him considerably.

SYMPTOMS ON ADMISSION.—On admission, the thorax is of large dimensions and well formed. On percussion, there is slight comparative dulness on the left side of the chest over the upper half in front; and there is also appreciable dulness over the same extent on the same side posteriorly. There is complete resonance on the right side anteriorly and posteriorly. On auscultation, for some inches below the clavicle on the left side, the inspiration is rough and harsh, and there is prolongation of the expiration. Lower down on the same side, there is also fine moist rale, and the vocal resonance is somewhat increased. On the right side there is loud pealing vocal resonance both anteriorly and posteriorly; it is particularly loud in front immediately below the clavicle, but there is nothing abnormal to be detected in the respiratory sounds. The expansion of the chest is equal on both sides. Breathing is equal and unembarrassed while he is sitting or lying in bed, but on using much exertion, it becomes short and difficult. There is some cough, but it is not very troublesome. States, that at the commencement of his illness, he could not lie on his left side; but at present he can lie in any position without uneasiness. The sputum is in considerable quantity, adheres tenaciously to the bottom of the spit-box, and is of an intense black colour. On being placed in water, a small portion of a lighter colour swims on the surface, but the greater part sinks immediately. On being allowed to stand for a little, the supernatant water becomes nearly clear, the dense black mass remaining at the bottom of the dish. Acetic, sulphuric, and nitric acids and also aq. potassæ, though boiled with the sputum, do not in the least affect its colour. The other systems are quite normal. Has good appetite, no sour or unpleasant taste in his mouth. Bowels are regular at present, and are generally so; has never had diarrhœa. Does not sweat at night, or when he is not employed at his work. Pulse during examination was 88, soft and full; during his stay in the house, has averaged about 76. He was ordered an expectorant mixture; and during the last fortnight he was in the house, he had three table-spoonfuls of cod-liver oil daily. He went out by his own desire in August, the symptoms having undergone little change.

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* Reported by Mr. W. Calder, Clinical Clerk.

MICROSCOPIC EXAMINATION OF THE SPUTUM.—On placing a small portion of the sputum below the microscope, many of the epithelial cells are seen loaded with the black carbonaceous matter. In some of them, the nuclei are evident, the matter being deposited between them and the cell walls; in others, the nuclei are quite concealed. In other parts of the field, all appearance of cells is lost, and nothing but apparently homogeneous black masses are visible. Some of the cells may also be seen ruptured, and the black contents poured out. (See Fig. 319.)

Commentary.—The physical signs existing in this case leave us in little doubt that there was considerable condensation at the apex of both lungs. This was indicated on one side by considerable dulness on percussion, and on the other by a pealing vocal resonance. It is true, the resonance in this place was unaccompanied by any change in the percussion note, a circumstance that may be caused by the existence of slight emphysema counterbalancing the increased limits of the pulmonary tissue. The history of the man's case, the nature of his employment, and the black sputum, at once indicated to us that this condensation was owing to accumulation of carbonaceous matter in the lungs, a disease which is peculiarly apt to occur in coal-miners, the moulders in iron and copper, and a few other trades.

CASE CXLVIII.*—*Carbonaceous Lungs with Black Expectoration in a Female.*

HISTORY.—Christina Nasmyth, æt. 42, the wife of a coal miner residing at Musselburgh—admitted 21st May 1857. For nine years previous to marriage she worked in a coal pit, being engaged in pushing the trucks along the tram-ways. She married at sixteen years of age, and has never since worked in the pit. She has had four children, all healthy. Her own health she declares to have been excellent till January 1857. About this time she noticed a cough accompanied by sputum of inky black colour, and by sense of pain over the breast and between the shoulders.

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* Reported by S. de Melho Asarappa, Clinical Clerk.

Her appetite failed, and she became very weak. Latterly her voice has become hoarse and broken. Medical treatment before admission had not been effectual.

Symptoms on Admission.—No dyspnœa; cough is unfrequent, short, and rather dry; sputum scanty, consisting of frothy blood with tenaceous masses of bluish-black mucus; painful sense of tightness over the breast; the voice is harsh and broken. There is slight dulness under right clavicle, with creaking sound during inspiration, prolonged expiration, and some increase of vocal resonance. There is crack-pot sound under left clavicle, bronchial respiration with a few moist sounds at close of inspiration, and increased vocal resonance; posteriorly, percussion seems unimpaired; no moist sounds are audible, but occasional sibilant and snoring sounds during expiration over middle of both lungs. The cardiac organ is normal in position and size; the first sound is rough at apex; the pulse is 80, and of good strength. Appetite is defective; occasional thirst in the mornings; no vomiting; considerable flatulence; bowels are opened generally every second day; menstruation regular; urine, 1010 sp. gr., otherwise normal.

Progress of the Case.—*May* 23*d*.—No trace of blood in the sputum, which consists of several tenaceous masses of a bluish-black colour, floating in a slightly viscous mucus. On microscopic examination, there are seen numerous molecules of pigment occasionally lying free, but sometimes contained in large cells; there are also visible a few bundles of fibrous and elastic tissue. *Ordered milk and steak diet.* 26*th*.—No moist sounds are now audible under left clavicle; respiration continues to be loudly bronchial at left apex, and less so, but still unusually loud over the right; hoarseness of voice has diminished. 27*th*.—*Ordered Emplastrum Picis* (6 X 6) *to be applied over the chest.* 28*th*.—No change in respiratory murmurs, nor in sputum; some dyspnœa, and considerable debility. *Is ordered a mixture of sweet spirits of nitre and aromatic spirits of ammonia.* 29*th*.—The black masses are now fewer in number. *June* 1*st*.—Hoarseness of voice has ceased; sputum more scanty, with fewer black masses; appetite is improved; patient walks daily about the ward. *June* 6*th*.—Has continued in the same state as in last report; is anxious now to return to her family, and is accordingly discharged to-day relieved.

Commentary.—It would appear from the account of this woman, that from the age of seven to that of sixteen years she worked in a coal-pit. She then married, ceased to work in the pit, and continued healthy for twenty-six years. Then for the first time cough came on, accompanied with black spit and disorganization of the lung. This circumstance proves that the tendency to carbonaceous formation may be formed several years before it becomes manifested in active disease, which may be induced subsequently by any of the ordinary causes which occasion bronchitis or pneumonia. Young girls are not now so much employed in coal-pits as formerly, and such a case as the above must now be considered, in many points of view, as one of great rarity.

From the circumstance of this disease being very common among the colliers in the neighbourhood of Edinburgh, it has been thoroughly studied here. In the first case that was recorded by Dr. James Gregory, the black matter was analysed by Dr. Christison, and shown by him to consist of pure carbon or lamp black, a result confirmed by every subsequent writer. The papers by Dr. William Thomson, inserted in the XX. and XXI. Vols. of the Transactions of the Medico-Chirurgical Society of London, contain a mass of important information concerning this disease; and in a series of communications by the late Dr. Mackellar, inserted in the "Monthly Journal" for 1845, you will find numerous facts and opinions regarding it, the results of long and extensive practice among the colliers of Haddingtonshire.

On examining the lungs of those who die labouring under this disease, they are found to present a deep black colour, which is most intense towards their apices. On section, the pulmonary tissue yields on pressure a copious black inky juice, which stains all surrounding objects, attaches itself to the inequalities on the skin of the hands, and insinuates itself under the nails like fine black paint. At the apices of the lungs, the pulmonary tissue is generally more or less condensed, and the black matter thicker, and often of the consistence of putty. In advanced cases, ulcerations and cavities exist, exactly resembling in all their characters those of phthisis, with the exception that no tubercle can be discovered, and that the whole is of an intense black colour. Occasionally black indurated and gritty masses can be felt and dug out, which in some rare cases present a slight crystallized structure, like coal or crystallized carbon. The morbid anatomy of the disease will be best understood by carefully examining the preparations which exist in the University Museum.

On placing some of the black fluid squeezed from the lung under a microscope, and examining it with a power of 250 diameters linear, it is seen to consist of a multitude of black molecules of extreme minuteness floating in a liquid. Here and there may be observed cells, similar to those previously described as existing in the sputum, more or less loaded with similar molecules of black matter, on which the strongest chemical re-agents produce no effect whatever.

When we endeavour to investigate the pathology of this disorder, we are met with a host of difficulties. Does it originate from the inhalation of carbonaceous particles floating in the atmosphere, or is it the result of a secretion of carbon in the pulmonary system itself?

The principal fact on which the first opinion rests, is the frequency of the disease in colliers, and in moulders of iron and copper. Yet it is curious, that whilst it is common among the workmen of some coal-pits, it is unknown among those employed in others. For instance, it exists to a great extent among the colliers of Fife, Haddingtonshire, and Midlothian, but is unknown at Newcastle, Paisley, or Alloa, although the dust and powder is as finely levigated in one place as in another.

There is another curious fact connected with the disease in coal miners, viz., that those engaged in working at what is called the *coal* wall, and in sifting or transporting the coal, are little affected; whilst those who work at the *stone* wall are peculiarly liable. This working at the stone wall, consists in blasting the rock by means of gunpowder. Hence the prevalence of black deposits in the lungs has been by some not so much attributed to the dust of coal, as to the smoke of the explosions, or of the lamps carried by the miners, confined as it is in narrow passages, where little ventilation exists.

Even this explanation has difficulties; for it has been proved, that in some mines, where blasting is carried on very extensively, and where there is much coal dust, it does not exist at all; and hence it has been supposed that there are some kinds of stone which disengage gases, or the working among which is much more deleterious than others. Thus Mr. Philp of Aberdour, who has had great experience in this disease, in a communication he made to Dr. Thomson, says, "In working at stone work, that is, in sinking pits and driving mines of communication, the workmen are exposed, in an imminent degree, to the influence of the impure air; for, besides working in a confined space, and in a *cul-de-sac*, where the ventilation is very imperfect, there is also a considerable exudation of the carbonic acid gas from the fresh cut surfaces of the minerals. In this impure air they continue to work for many hours daily, for some months, their operations being frequently carried on several yards in advance of where their lamps will burn." In another place, he says, "Those pits and mines which have been noted for the impurity of the air, have given origin to the greatest number of cases."

Again, Mr. Steele of Craighall says, he considers the disease to be caused by running mines in stone, and working in impure air. He also observes,—"A principal reason is, that the stone contains some poisonous matter, which is probably of a metallic nature, as the workmen complain of it exciting a styptic and metallic taste in the mouth. A mine was carried across the strata in the Niddry estate, the finishing of which required a number of years. Six or eight of the miners employed in it died; several were obliged to leave it, and only one of those who commenced it was able to work in it throughout, and lived to see it completed. There was a particular stone in this mine, which was repeatedly met with, and to which the miners gave the name of arsenic, which was found highly pestiferous. Its exact nature I am not acquainted with. In a stone mine, run some years ago in the Newbattle field, a great many men died,—the average length of time each of the miners employed in it lived being about two years. The mortality was ascribed to the nature of the stone."

The facts connected with this peculiar black colouring of the lung leave it therefore undecided whether it be owing to the inhalation of coal dust, the smoke of gunpowder and oil lamps, or carbonic acid gas, entering the lung. Is the powder deposited directly and primarily in the minute tissue of the organ, or is the carbon deposited secondarily, and by a process of secretion from the blood?

Before we can answer these questions, there are two other series of cases, which it is necessary to take into consideration. 1*st*, Persons have been known to have the black spit, and black infiltrated appearance of the lungs, with caverns, without ever having been in a coal mine, or exposed in any way to gunpowder smoke. Several such cases are given in the paper of Dr. W. Thomson. One of these is by Dr. Browne, now Commissioner of Lunacy for Scotland; another, by the late Dr. Moir of Musselburgh. The subject of this last case was never exposed to noxious vapours, unless it might be *carbonic acid*, —as he was the proprietor of an extensive brewery, and in the daily habit of inspecting the tun-rooms, the large vats in which overflow with that deleterious gas. Another case was observed by the same gentleman, in the person of a coachman, where, after death, the lungs were found to contain collections of an inky or tarry fluid, which stained the fingers, as if with soot or charcoal. A fourth and similar case, in a woman, is related by Dr. Veitch. In none of these cases were the individuals exposed to the fumes of smoke, or coal dust. I have myself seen several of such cases; in one especially, a cyst in the bronchial gland existed, about the size of the human eye-ball, filled with a black inky fluid.

2d. M. Guillot of Paris has brought forward another series of cases in old persons.* He is physician to the hospital for aged people, and says there is scarcely an individual of advanced life who does not present the carbonaceous deposit in the lung, generally most marked at the apex. The carbon often exists in crude masses, obliterating the vessels and bronchial tubes. I have also seen many cases of this kind, and there can be no doubt that the longer we live, the more carbon is deposited in the lungs. In infants, as is well known, these organs are of a light pink colour, and they become more gray and of a deep blue or black tint as life advances.

What are we to conclude from these cases? The black matter in all of them, when chemically examined, is undoubtedly free carbon, and is distinguished from the similar occasional results of chronic pneumonia, and changes of the blood by the action of chemical agents. Dr. Pearson † thought that we are always insensibly breathing an air more or less loaded with smoke, the results of combustion, and other impurities; and that this of course accumulates the older we get. If this opinion were true, it should be more common in persons who inhabit densely inhabited and manufacturing towns, as London, Liverpool, Manchester, or Glasgow. Yet we do not find this to be the case. The air in Paris is remarkably pure, the fires of manufactories are few, and yet there, according to Guillot, it is common.

On the other hand, should we conclude that it is formed internally by a chemical process, in all cases? If so, must we ascribe it rather to the inhalation of carbonic acid gas, than to carbon in a minutely divided state, inspired from without? In the present state of our knowledge, we cannot answer these questions with any exactitude.

Another point of great interest is the apparent antagonism of carbonaceous deposits with tubercle.

We frequently find the black lungs of colliers to contain small or large ulcerated cavities, with bands crossing them; but we rarely find tubercle. In one or two cases chronic tubercle has been found; but it does not appear that the caverns filled with black matter in the miner are owing to tubercle. Such is the analogy, however, existing between these cavities, and the symptoms they occasion, that the disease has been named "black phthisis" by several persons. Some have supposed that tubercular phthisis is first set up, and that the carbonaceous deposit is then insinuated among the textures and ulcerations. By others, and especially by the late Dr. Mackellar, it is maintained that there is never tubercle in these cases, and that ulceration is entirely owing to the accumulation of masses of carbon which are expectorated. I have carefully examined several lungs in various stages of the disease, but have never been able to satisfy myself of the existence of tubercle. The difficulty of the investigation, however, is very great, for it is probable that, did a tubercular exudation exist, it would be so impregnated with the carbonaceous matter, as not to be recognisable even under high powers. On the other hand, the bronchial tubes are frequently loaded with purulent matter of the usual appearance, but which, instead of presenting pus-corpuscles, is loaded with particles closely resembling those found in softened tubercle.

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* Archives Generales de Medecine, vol. 67.

† Philosophical Transactions, 1853.

Guillot has alluded to the well-known fact, that in old persons who present traces of tubercle, the cretaceous concretions are always surrounded by black matter. He thinks that the carbonaceous deposit compresses the capillaries which immediately surround the tubercle, prevents its further exudation, and so induces cure. But this is by no means invariable. Still it is an undoubted fact, that the black matter, like tubercle, always exists in greatest proportion at the apex of the lung, and the rarity of recent tubercle in combination with it, leads us to suppose that it exerts a peculiar influence on tubercular deposits. I have also seen black matter surrounding tubercle of the peritoneum, but in this situation it has not been free carbon, for long immersion in spirit has caused the disappearance of all colour.

So far as my observations have yet carried me, no difference is to be determined structurally between the pigment of melanosis and that of the disease under consideration. Some cells spit up by the miner, containing black granules, exactly resemble those in melanic cancer. On the other hand, there is a marked difference in the chemical constitution; as in the one, the black pigment, whatever be its nature, is fugitive, and removable by mineral acids; in the other, fixed, and unchanged even under the blow-pipe. Hence all black deposits may be divided into two classes; to distinguish which we may call one class by the name it has so long borne, viz., "*melanotic*," and the other, from its chemical composition, "*carbonaceous*."

With regard to the treatment of individual cases of black phthisis, there is little to be said. The disease, once established, does not admit of cure by art; and it is a curious fact, that a man may work in a coal mine for many years without the black spit; but when it comes on, even should he leave the mine immediately, he will continue to expectorate carbonaceous matter for a long time afterwards. Of this both the cases before us furnish us with examples, and the circumstance is one which constitutes a strong argument in favour of those who contend for the disease being dependent upon a secretion rather than a mechanical deposition of carbon. A palliative treatment, guided by the nature of the symptoms and strength of the constitution, is all that is admissible. The only means of preventing the disease seems to consist in ventilating the mines where colliers work, or adopting the means of carrying off the fumes to which the moulders of iron and copper are exposed. Such prophylactic measures are equally called for, whatever theory of the nature of the disorder shall ultimately be proved to be correct.

Before leaving the subject of diseases of the respiratory system, I must point to the great occasional diagnostic value of a microscopic examination of the sputum, previously alluded to, p. 82. I have now in this way not only recognised phthisis pulmonalis before the occurrence of marked physical signs, but have been enabled to determine the existence of ulcerations, by finding fragments of lung tissue in the sputum, under circumstances where otherwise this could not have been determined. (Cases LXXXVII. and CXLVIII.) The former figures given of these fragments (p. 84, Figs. 48 and 49) are not so characteristic as I could wish; I therefore append those given by Van der Kolk, a study of which will lead to their ready detection in expectorated matter.

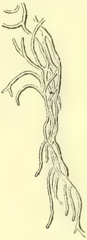
Fig. 407.

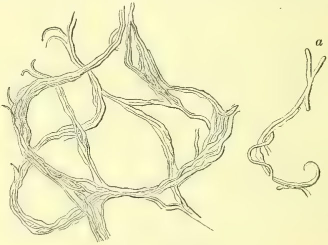

Fig. 408.

Fig. 407. Fragment of elastic tissue of the lung, in phthisical sputum.

Fig. 408. Fragment of areolar and elastic tissue, still exhibiting the form of air cells, from phthisical sputum. *a*, Another fragment.—(*Van der Kolk.*) 250 *diam.*

SECTION VIII.

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DISEASES OF THE GENITO-URINARY SYSTEM.

In no department of medicine has our knowledge of the diagnosis and treatment of disease made more rapid progress in recent times than in that relating to disorders of the genito-urinary system. Notwithstanding what has been very justly said as to the impropriety and frequent danger of unnecessary mechanical exploration of the female passages with instruments, it cannot be denied that, used with judgment and discretion, they have materially contributed to a recognition and successful treatment of lesions that would otherwise have been unknown or misunderstood. The use of the microscope in the examination of the urine, conjoined with an histological investigation of those morbid alterations in the kidney, hitherto grouped together under the name of "Bright's Disease," have also thrown a flood of light upon a class of disorders formerly involved in the greatest obscurity, besides opening up a field to the chemical pathologist in his endeavour to work out the transformations necessary for the excretory processes, which cannot be too highly valued. From these various investigations medicine has already derived much advantage, and will doubtless obtain much more. The diseases of the generative organs of women, however, constitute at present so peculiarly a speciality of the obstetrician, that the only one of them that I shall allude to is

OVARIAN DROPSY.

Case CXLIX.*—*Ovarian Dropsy—Frequent Paracentesis—Excision of both Ovaries—Strangulation of the Intestine—Phlebitis—Death from Ileus the seventieth day after the operation.*

History.—Jessie Fleming, unmarried, æt. 20—admitted July 5th, 1845. She states, that eighteen months ago she first perceived a tumour in the lower part of the abdomen, deep seated in the middle of the hypogastrium. She remembers that she could push it aside in various directions without pain, and that at this time it was about the size of an orange. She can assign no cause for its appearance. The tumour rapidly increased in bulk, until at the end of ten months the abdomen was greatly distended—so much so, that respiration and progression were rendered difficult. Paracentesis was now performed, and forty imperial pints of a viscid yellowish-coloured fluid were removed. The abdomen, however, again rapidly increased in size, and paracentesis was again had recourse to. The operation has now been performed six times, the intervals between each becoming less and less lengthened, and the amount of fluid, though always considerable, varying in amount. She says that immediately after every tapping, a tumour can be felt about the size of a child's head on each side of the abdomen; that these tumours (she thinks there are two) are movable laterally, but seem to grow from below. She thinks the one on the left side is larger and higher up than that on the right. Her general health has been little affected by the disease.

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* Reported by Mr. D. P. Morris, Clinical Clerk.

Symptoms on Admission.—At present, July 6th, she complains of pain in the head, which is stated to be dull and heavy, and seated principally over the forehead. It comes on occasionally, and lasts for three or four days at a time. She has pain in the loins very frequently, especially when the dropsy is large. Special senses and common sensibility normal. Her sleep is much disturbed by breathlessness, and by the semi-erect posture the dropsy requires. Motion is impeded by the size of the abdomen, and from its great weight. There is much muscular weakness. The abdomen measures 48½ inches at its largest girth, which is just above the navel. It fluctuates distinctly. Dulness of the liver cannot be defined by percussion. The skin of the abdomen is marked by transverse fissures or marks of a purplish colour; it often feels very hot and as if it were bursting; tongue clean; appetite a little impaired; no thirst or sickness; bowels regular; stools somewhat fluid, but of healthy aspect; urine scanty, thick, high coloured, of acid reaction, containing a yellowish brown sediment, but unaffected by heat; skin dry, not warmer than usual. She states that she never perspires. Has no cough or pectoral complaints except dyspnœa, which is very severe at night. On auscultation the chest appears to be healthy. Pulse 88, sharp and small; heart's sounds apparently abrupt, but natural. The catamenia have appeared at irregular intervals, sometimes of three weeks, at others five weeks, and when present are profuse.

Progress of the Case.—From this time she remained generally in about the same condition. The urine passed in the twenty-four hours never exceeded twelve ounces, and on one occasion was as low as six ounces. The abdomen gradually became more tense and the dyspnœa more urgent. *July 12th.*—Mr. Syme performed the operation of paracentesis of the abdomen. The trocar was introduced to the left of the *linea alba*, about two inches above the pubic bone. Five imperial gallons of a yellow-coloured transparent fluid were removed. The last four ounces which came off were viscid like white of egg, and contained a few yellowish opaque flocculi. The fluid was densely coagulable on adding heat or nitric acid. The flocculi when examined with the microscope were found to be composed not of lymph, as was at first supposed, but of numerous cells, varying in size from the 100th to the 40th of a millimetre in diameter. The great majority were about the 50th of a millimetre. They were slightly granular, of round and oval shape, unaffected by water, but becoming more transparent on the addition of acetic acid, and exhibiting a distinct nucleus about the 140th of a millimeter in diameter. (See Fig. 70.) The nucleated cells were imbedded in a granular matter which could easily be broken down. Shortly after the operation, she complained of considerable pain in the abdomen towards the left side, which was not increased on pressure. Fifty minims of tincture of opium to be taken immediately. *July 15th.*

—Has continued to feel more or less pain in the abdomen, which is not superficial or peritoneal. The bowels have been freely opened by compound jalap powder, and has passed from 48 to 50 oz. of urine daily. The puncture is now healed; the abdomen is still voluminous, but soft. On palpation, a tumour with distinct margins, about the size of the adult human head, may be distinctly felt, firmly attached inferiorly within the pelvis, but its upper portion movable to a considerable extent from side to side. She describes the pain as being of a dull, gnawing, and continued character; not lancinating nor increased on movement. Pulse 98, of natural strength; tongue slightly furred; has tolerable appetite; no thirst, but says she vomits everything she takes. The matters vomited are thrown up about ten minutes after each meal, in successive mouthfuls, accompanied by gnawing pains at the stomach. These latter pains are felt under the false ribs on the right side. The stomach is often felt to be distended, followed by considerable eructations of gas; bowels have been open four or five times; urine much increased in amount since the operation; to-day she passed thirty-eight ounces. The compound jalap powder was directed to be given again. *July 18th.*—To-day she was carefully examined by Professor Simpson, who employed his uterine bougie. By this means the fundus of the uterus was raised above the brim of the pelvis, where it was distinctly felt presenting its obtuse, rounded, natural form. The Professor stated his opinion that the tumour was connected to the left ovary by a narrow pedicle. Urine ten ounces. *July 19th.*—The examination of yesterday was followed by great pain. She described this as being " tremendous," and seated in the back. The nurse said she cried out as a woman in labour. About two and a half hours afterwards a draught containing one drachm of solution of morphia was given. It relieved the pain, but it continued until 11 P.M. An anodyne and ether draught was then given, which was immediately rejected by vomiting. *August 7th.*—Since last report the vomiting has gradually abated, under the influence of opium and creosote pills. The urine, however, has again diminished in amount, and for the last ten days has only been from ten to twelve ounces, while the size of the abdomen has slowly increased to its former volume. To-day, paracentesis was performed by Dr. James Duncan, and five and a half gallons of fluid removed, presenting the same characters as that described July 12th. Soon after the operation she experienced considerable pain in the back and upper parts of the abdomen, which ceased at midnight after taking a draught with half a drachm of the solution of morphia. *Aug. 16th.*—Since last report has been in the Surgical Hospital. Dr. Bennett proposed to the acting-surgeons severally the operation of ovariotomy, which they declined to perform. To-day, accordingly, she returned to the medical ward. During the interval her general health has been good. The fluid in the abdomen is again accumulating. By a careful examination the tumour can be ascertained to be quite free from adhesions to the anterior walls of the abdomen. These latter can be pulled forwards and held steady, while the tumour is made to roll free beneath. Passed during the last 24 hours eighteen ounces of urine. The liver was carefully percussed. Its extreme dulness in the right hypochondrium is three inches; it is pushed considerably upwards, the upper line of dulness being on a level with the nipple. She denies ever having suffered from dyspeptic symptoms, or so-called attacks of bile; and her general health is in every respect good, and the amount of urine discharged diminishing. Her general health is not so robust as when she first entered the house. Dismissed from the Infirmary *August 24th.*

September 3d.—After leaving the Infirmary, she went into lodgings, having been placed by Dr. Bennett under the care of Dr. Handyside. On the 2*d* that gentleman performed paracentesis, and removed four gallons of fluid, and to-day, having satisfied himself that this was a case urgently calling for the performance of ovariotomy, he consented to perform it according to the request previously made to him by Dr.

Bennett. *Sept. 5th.*— Bowels have been opened four times during the night, the last time at 8 this morning, from a purgative of Ext. Colocynth, gr. x., administered yesterday evening, and a domestic enema given this morning. She is in good health and spirits. Tongue clean.

Operation of Ovariotomy.—The operation was performed, *September 5th,* at half past 12 by Dr. Handyside, in the presence of Drs. Beilby, Simpson, W. Campbell, A. D. Campbell, Baillie, Bennett, and Struthers, and Professor Goodsir. The temperature of the room was raised to 72°. The patient was placed on a table before a good light, her feet resting on a stool, and her shoulders raised and supported by pillows. Dr. Handyside, now, standing to the right side of the patient, made, with a strong scalpel, an incision of about three inches in length through the skin and subcutaneous cellular tissue, midway between the umbilicus and pubis and over the *linea alba.* This incision was deepened carefully, the *linea alba* divided, and the peritoneum reached. A fold of this membrane was pinched up with the forceps, and a small opening made into it. Through this opening some glairy fluid escaped, indicating that the cavity of the abdomen had been opened. With a probe-pointed bistoury the peritoneum was now slit open to the extent of an inch less than the external wound. A large quantity of the glairy fluid then escaped, which occasioned some delay. Through this opening Dr. Handyside now introduced two of his fingers, in order to ascertain that no adhesions existed on the exterior surface of the tumour. None being felt, the wound was dilated upwards for other three inches, with a probe-pointed bistoury, which was guided by two fingers introduced into the abdomen. Through this opening Dr. Handyside introduced his whole hand, and finding the tumour nowhere adherent, the wound was extended upwards to rather more than midway between the umbilicus and the ensiform cartilage, and downwards to within two inches of the symphysis pubis. In cutting upwards, the umbilicus was avoided, the incision passing to the left side of it. Through the large opening the fundus of the tumour now presented, and the charge of it was committed to Professor Simpson, who drew it gently outwards. At this time, as well as before and after, care was taken to prevent protrusion of the intestines. This was done by Mr. Goodsir, who, with both hands, pressed the edges of the wound downwards and backwards against the intestines and from the tumour. On the anterior aspect and fundus of the tumour were now observed several round smooth-edged apertures, through which some of the glairy fluid was seen to escape, being of the same character as that which had flowed from the peritoneal cavity, but rather more viscid in consistence. One of these openings was dilated with a bistoury, which allowed of the escape of a large quantity of the glairy fluid. This had the desired effect of diminishing considerably the size of the tumour. The pedicle of the tumour was next examined, and it was found to consist of the left broad ligament of the uterus, somewhat elongated and enlarged, but not altered in texture. The uterus was seen to be of normal size, though of a rose-red colour, and to be unconnected with the tumour, except through the medium of the ligament. The pedicle of the tumour being now put on the stretch by exerting slight traction on the latter, a strong curved needle, in a fixed handle, and carrying a strong double ligature, was passed through its middle. The double end of the ligature being divided, each half was tied separately, so that each included one-half of the pedicle. Some delay was occasioned by the difficulty experienced in tying the ligatures, as the elasticity of the part included caused the first half of the knot to slacken before the other half could be thrown. The tumour now required to be removed. This was done by cutting carefully with a scalpel at about an inch beyond the part surrounded by the ligatures. In doing so a cyst, which had extended down to the pedicle, was necessarily opened, and some more of the glairy fluid escaped. During the division of the pedicle, venous blood escaped freely from the tumour, but after the removal of that latter, no bleeding occurred from the divided surface of the pedicle, although the mouth of at least one large artery was visible. The right ovary was now examined, and it was found to be enlarged to the size of a walnut, and to contain several small cysts. Accordingly, Dr. Handyside proceeded to remove it also. A needle carrying a double ligature was passed through the middle of the ligament of the ovary, and the ends tied separately in the same manner as on the other side. No bleeding followed the division of the ligament beyond the ligatures. The portions of the broad ligaments which were left were unaltered in structure. The four ends of ligature attached to each broad ligament were now tied together around the latter, and then three of the ends cut off so as to leave one only from each side hanging at the lower angle of the wound. The blood mixed with the remainder of the glairy fluid was now sponged carefully out of the lower part of the abdomen and the pelvis, which were exposed. The peritoneum lining the abdominal wall, as well as that covering part of the intestines, was now examined, and seen to be of a red colour; but on no part was there any mark of the effusion of lymph. Such of the intestines as were seen were quite natural in their appearance. All oozing of blood from the incisions in the abdominal wall having ceased, no vessel having required ligature, the edges of the wound, with the careful exclusion of the peritoneum only, were approximated and retained in accurate apposition by means of ten twisted sutures. Corresponding parts of the edges of the incision were indicated by the dark points and cross lines which were previously marked with the nitrate of silver, and which, on the now flaccid skin, were found to be of great use. A long pad of lint was now laid, as a compress, along each side of the wound, and a lighter one over it, and these were retained by broad strips of adhesive plaster. Lastly, over these pressure was made, and support given, by the ends of a double many-tailed bandage, which had been placed under the patient before the operation began, and which were crossed and pinned alternately at opposite sides of the abdomen. The patient was then placed in bed, a dry blanket having been previously wrapped round the thighs and pelvis. The patient bore the operation well. At one time she felt faint, but syncope never occurred, so that no stimuli were given. The pulse never sunk below 80, but remained most of the time between 90 and 100. The operation occupied in all about forty minutes. Fifteen of these were taken up in the preliminary incision, examination and removal of the large tumour,—five in the removal of the small one, and twenty in sponging out the pelvis, introducing the sutures, and applying the compresses, straps, and the many-tailed roller.

SUBSEQUENT PROGRESS OF THE CASE.—Immediately after the operation, *one drachm of the solution of Morphia* was administered. At 4 P.M. she complained of acute pain in the abdomen, and *two grains of solid Opium* were given in the form of pill. At 8 P.M. *another grain of Opium was taken.* At 9 P.M. the pain ceased on her being turned in bed. The pulse was 100, soft, and eight oz. of urine were drawn off by the catheter. *September 6th.*—Has taken during the night *a drachm and a half of Solution of Morphia,* which occasioned drowsiness but no sleep. At 2 P.M. there was slight difficulty of breathing. At 9 P.M. the pulse was 148, full and strong, and difficulty of breathing was increased; 20 *oz. of blood were taken from the arm. Sept. 7th.*—At 2 P.M. was allowed to have a little warm gruel, followed by *fifteen minims of the "black drop,"* as she was very irritable and restless. *Sept. 8th.*—Last night had some beef-tea and toast, and slept several hours. The wound was dressed at 2 P.M. for the first time. Union by first intention had taken place everywhere, except where the ligatures interpose. *Sept. 10th.*—Wound discharging freely around the ligatures. Complains of tormina and restlessness. Bowels open. At 9 P.M. there was considerable tenderness of the abdomen, and *twenty-four leeches were applied. Sept. 11th.*—Passed a tolerable night. Abdominal tenderness diminished, but still pain in left iliac region. Pulse 130, soft. Respirations thirty-five, but easy. *Twenty leeches to be applied over seat of pain, and three grains of James' powder, with half a grain of Opium every three hours. Soda water with Raspberry Vinegar for drink. Sept. 22d.*— Since last report has gone on well —occasional symptoms having been carefully treated. For the last few days has complained of cough, but on auscultation and percussion the lungs appear to be healthy. The nourishment has been gradually increased, and she has taken eggs and beef-tea, and to-day allowed two oz. of steak for dinner. Between three and four oz. of laudable pus escape daily from the wound round the ligatures. *Sept. 28th.*—Is so well that she sat up in a chair for some time. Appetite much improved, and has been eating meat daily. *October 3d.*—Has had slight diarrhœa. The discharge from the wound is copious and fœtid. In the evening, on pulling one of the ligatures, it came away, with a slough about three inches long, and the diameter of a crow quill. *To have a grain of Opium. Oct. 10th.*—Looseness of bowels returns occasionally notwithstanding the use of *Lead and Opium pills.* Cough has been troublesome, with to-day tenacious sputa, slightly tinged here and there of a rusty colour. On examining the chest, a crepitating rale is heard for the first time about the middle third of left back, and inferiorly there is sonorous rale, both with inspiration and expiration. Over the right back the respiratory murmurs are generally harsh, with increased vocal resonance, but no rale. On tightening the ligature, which is still firmly attached, about three ounces of thick greenish offensive pus flowed from the opening. *To lie on the face as much as possible.* ℞ *Mucilag.* ℥j ; *Syr. Simp.; Vin. Ipecac.* āā ℥ss ; *Sol. Mur. Morph.* ʒij ; *Aq. Font.* ℥iv ; M. *Capiat* ℥ss *quartâ quâque horâ.* At 9 P.M. the ligatures, on being firmly pulled, suddenly came away, producing a sensation as if she had received a blow in the abdomen. There was no slough attached, and the separation was not followed by blood, although flakes of dead tissue were observed in the pus. Pressure was made by pads over the iliac fossa and umbilical region, so as to direct the pus externally. *Oct. 20th.*—Since last report there has been much cough, with all the signs and symptoms of limited pneumonia of both lungs, posteriorly and inferiorly. The pulse has varied from 120 to 140, and been soft, and the treatment has consisted of rest in bed, anodynes at night, with wine and nutrients. Yesterday a blister was applied to the left thorax, inferiorly, and to-day she is much better. All crepitation has disappeared ; the cough has ceased. Over left back inferiorly, near spinal column, there is a space the size of a hand, dull on percussion. In the last few days she has been eating food with appetite, and sitting up an hour daily. *November 1st.*—Since last report, although the physical signs of chest have undergone little change, her general health has been so good that she has been up daily, and walks freely about her room. About half an ounce of healthy pus is discharged daily from the wound. At half-past 4 P.M., during the temporary absence of the nurse, feeling very hungry, she went to the press, where the provisions were kept, and ate half a teacupful of arrowroot, half a pint of strong soup, a small piece of roast beef, and a piece of bread, being all the food she could get at. Immediately afterwards, she experienced severe griping pains over the whole abdomen, followed by vomiting of the matters taken. The abdomen became distended and tympanitic above the umbilicus, and a curve of intestine was very prominent in this situation, and clear on percussion. *A few drops of Ol. Menth. Pip. afforded slight relief, and warm fomentations were applied to the abdomen.* Frequent vomiting of a greenish fluid, however, continued, and in the evening *five grains of Opium were given in the form of suppository. Nov. 2d.*—An enema was given at 10 A.M., and another four hours afterwards, without causing any evacuation from the bowels, which have not been opened since 6 P.M. on the 31*st of October.* 8 P.M.—There has been frequent retching during the day, with discharge of mouthfuls of mucus. Marked difference between tympanitic fulness and distension above the umbilicus, and the flatness and collapse of the abdomen below it. Had nothing to eat, and drank only a little coffee. ℞ *Calomel gr.* viij.; *Gum. Opii. gr.* ij; *Con. q. s. ft. pil.* ij. *One to be taken immediately. Four pounds of warm water to be injected slowly. If no motion by* 12 *o'clock, to have an enema, composed of an infusion of six ounces of boiling water added to* 15 *grains of tobacco. Nov. 3d.*—The warm water injection returned immediately with much flatus and some small pieces of fœculent matter. The tobacco injection was not given. This morning the countenance is anxious; pulse 120, small; tongue furred; great thirst; no appetite; considerable distension of the upper part of the abdomen, and a distended knuckle of intestine prominent and strongly marked out below the integument, pressure on which causes tenderness. *Twelve leeches to be applied to the abdomen. To have the tobacco injection.* 8 P.M.—This morning the tobacco injection (not quite the whole of it) was given. It was retained ten minutes, and caused considerable collapse, with tremors and vomiting. Two large warm-water injections have been subsequently given, which have returned without fœces. No tenderness of abdomen, to which *a turpentine embrocation is ordered to be applied. Nov. 4th.*—Complained last night of a throbbing pain in the calf of left leg, and swelling of foot and ankle. To-day the whole limb is swollen as high as the groin, and an induration is felt in the course of the femoral vein. The vomited matters were clearly fœculent. From this time she gradually sank. She vomited from time to time matters sometimes fœculent, at others bilious, and occasionally felt colic pains. She became greatly emaciated, which permitted the swollen and tympanitic intestines to be strongly marked out above the umbilicus. The pulse varied from 130 to 150, and was not absolutely weak until the day she died. Calomel and opium pills were continued, with occasional injections per anum, and small quantities of nourishment. The mind remained unclouded to the last, and latterly the tympanitic distension of abdomen and swelling of right inferior extremity somewhat diminished. On *Nov. 12th*, at midnight, she requested the nurse to raise her up. This was done, when she fell back and expired—the 70th day after the operation.

Sectio Cadaveris.—Forty hours after death.

The body was greatly emaciated. The head was not opened.

THORAX.—The cavity of the pleura on the left side contained about one ounce, and on the right about two ounces of serum. On the left side the pleuræ were adherent so strongly, that the lung was lacerated in removing it: this more especially between the inferior surface of the lung and upper surface of the diaphragm. On the right side the pleuræ were adherent at the apex, and over inferior lobe, but the adhesions were easily torn through. The anterior margin of the upper lobe of the *left lung* was emphysematous; its posterior portion slightly engorged. On section it crepitated readily, and was healthy in structure. The inferior lobe felt dense externally, and on section the parenchyma was of a brownish red colour; splenified; easily breaking down under the finger, and portions of it placed in water sunk nearly to the bottom of the vessel. The two upper lobes of the *right lung* very emphysematous anteriorly, engorged posteriorly and inferiorly, but otherwise healthy. The anterior half of the inferior lobe also emphysematous, with here and there indurated patches of chronic lobular pneumonia. The posterior half of this lobe was splenified throughout, as in the opposite lung. The lining membrane of the bronchi was healthy, here and there covered with mucus. Both lungs were small in volume. The *heart* was small and pale. Its right cavities contained a firm dark coagulum. The valves and structure of the organ healthy. In the aorta there was a small but firm coagulum, partly decolorized.

Abdomen.—On reflecting the walls of the abdomen, a few chronic bands of lymph were torn through, uniting the opposite portions of peritoneum. The line of incision was firmly united except at its lower end, where a round opening existed about the size of a pea. On the peritoneal surface the union was marked by a dark blackish line, which was perfectly smooth and free from lymph. The omentum was thin and transparent, destitute of fat, and stretched tightly over the intestines. Its inferior margin adhered strongly to the visceral and parietal peritoneum, about an inch above the pubic bones. The omentum was cut through transversely about its middle, and the intestines below exposed, which were greatly distended with gas. These were found to be portions of the ileum, the coils of which were more or less adherent to each other, to the mesentery, omentum, and to the neighbouring organs, by bands of chronic lymph. The adhesions were now carefully torn through, the gut liberated and traced downwards. Exactly five feet and a half from the cœcum, above and to the left of the umbilicus, the intestine was constricted by a band of lymph, as if a ligature had been tied round it. Above the constriction the gut was distended to about the size of the wrist; below, it was collapsed to the size of the little finger. Air could be pressed from the superior portion into the inferior, but the passage of water poured from above was completely checked at the seat of stricture. All the intestines above the stricture were greatly distended with gas; those below it, including the cœcum, colon, and rectum, were small and collapsed. The cavity of the pelvis was blocked up, and separated from the general cavity of the abdomen by firm adhesions between the surfaces of the abdominal walls, the omentum, and knuckles of intestine. The peritoneum in this place, and especially in the left iliac hollow, was covered with a dense layer of chronic lymph. This lymph was about one-eighth of an inch in thickness, of a dirty greenish colour, mixed with black pigmentary matter, of great hardness to the feel, and cut under the knife like cartilage. With some trouble, the united knuckles of intestine and portions of omentum involved were separated and drawn out. A cavity was thus exposed, about the size of an orange, situated between the uterus and rectum, lined throughout by the same dense, chronic lymph spoken of above. The anterior surface of the uterus was firmly united to the bladder by chronic adhesions. On the right side about one inch of the Fallopian tube and broad ligament remained, the extremities of which were closely united to the anterior wall of the cavity. On the left side the margins of the uterus and short pedicle of the broad ligament were so united to the walls of the cavity that they could not be separated. This cavity or pouch between the uterus and rectum communicated with the external opening, and was evidently the place where the pus during life had accumulated. A sinus opened into it superiorly, which on being traced upwards was seen to extend, above the descending colon, between the peritoneum and intestines as high as the diaphragm on the left side, where it terminated in a cul de sac, the size of a hen's egg. The sinus was about the size of the little finger, and lined throughout by the same dense, greenish lymph formerly noticed. The cul de sac was full of dirty-yellow offensive pus, and bounded by a portion of the stomach and left lobe of the liver internally; the diaphragm above and posteriorly; and the colon and spleen externally and inferiorly. It also was lined with dense chronic lymph. The mucous membrane of the stomach and small intestines was healthy. The latter contained a clayey coloured soft fœculent matter. The large intestines were empty. No appearance of inflammation existed at the constricted part. The internal surface of the rectum, extending seven inches from the anus, was intensely vascular, thickened, and inflamed. Six ulcers, varying in size from a sixpence to that of a shilling, were scattered over the diseased part of the gut, one of the largest being only an inch from its extremity. They were round in shape, and covered with a raised dirty greenish slough. The *liver*, *kidneys*, and *spleen* were anæmic, but healthy in structure. The *femoral* and *saphena veins* could be felt hard and distended below the integuments. On dissection, these, as well as the external *iliac vein*, up to the point where it passed under the layer of lymph, in the left iliac hollow formerly described, were found to be obstructed by a coagulum of blood. This coagulum was adherent to the internal wall of the vessel, was partially decolorized, and of the consistence of soft cheese. This obstruction of the vessels ceased about three inches below Poupart's ligament.

Description of the Tumours removed.—The tumour which involved the left ovary, on being removed, weighed nine pounds and a half. It was of an oval form, and measured thirteen inches in its longest, and nine inches and a half in its shortest diameter. Its envelope was composed of white, dense, and glistening fibrous tissue, having upon its external surface patches of various sizes, resembling chronic lymph. On its anterior surface might be seen openings, or ulcerations, varying in size. The edges of these ulcerations were smooth and rounded, and of the same thickness as the fibrous envelope. The cut surface, which had been near the ligature, now presented a large opening into the tumour, through which numerous cysts, varying in size from a pea to that of a billiard ball, protruded. The incision into it, made during the operation, had opened up one of these cysts about the size of a cocoa nut. The tumour was sent to the University Museum, minutely injected by Mr. Goodsir and afterwards cut up, in order to show its internal structure. In dividing it, some of the internal cysts were found to be full of pus, whilst others contained the usual glairy fluid, common to these tumours. Three preparations were made from this tumour, which may be seen in the museum, and which demonstrate the following facts:—

1st. A portion of the fibrous sac, showing the attachment of numerous cysts varying in size and shape. A minute injection has been thrown into the arteries (?) and exhibits how richly the walls of the internal cysts are supplied with blood-vessels. One of these cysts, about the size of a small hen's egg, has its upper half fully injected, whilst the lower half is pale. The margin between the two is uneven but abrupt, and from the creamy and distended appearance of the cyst, there can be no doubt that it is full of pus.

2d. A portion of the fibrous sac, showing the incision which separated the tumour from its attachments. The opening is of an irregular form, about three inches in its longest diameter.

3d. A portion of the fibrous sac, showing the ulcerated openings formerly described.

The right ovary was about the size of a walnut. It was formed externally of a dense fibrous capsule, and internally of several small cysts. The natural stroma of the organ had entirely disappeared.

Commentary.—The life of this young woman was rendered miserable by the enormous size of her abdomen, and the difficulty it caused to the functions of respiration, micturition, locomotion, etc. She earnestly desired that any operation should be performed which held out a prospect of relief, and bore the excision of both ovaries, which was most skilfully performed, with the greatest courage. From this she may be said to have recovered, for, notwithstanding the chest complication which arose, she was from the forty-eighth to the fifty-eighth day after the operation so well, that she sat up and walked about without inconvenience. On this last day, feeling the intense hunger of a convalescent, she took advantage of the nurse's absence, and ate largely. The stomach thereby was distended, the intestines displaced, so that a filament of chronic lymph, attached to the abdominal walls, became twisted round a portion of bowel, causing complete mechanical strangulation of it, and death twelve days later, with all the symptoms of ileus. To this accidental circumstance, and not to any direct result of the operation, must the fatal result be attributed.

The question I have frequently asked myself is, Was I warranted in proposing and urging others to perform the operation? The reasons that induced me to do so were the following:—*1st*, The youth and good constitution of the patient. *2dly*, The disease was rendering her life miserable, and she earnestly wished the operation to be performed. *3dly*, Death seemed unavoidable at no distant period. At least it could not be anticipated that five gallons of fluid could be removed from the abdomen every three weeks, for any length of time, without injury to the vital powers. *4thly*, Extirpation of the tumour appeared to be the only possible means of cure. *5thly*, The care I had taken in forming the diagnosis, and my conviction of its accuracy, which was afterwards fully confirmed.

Again, on looking at the statistics of the operation, previously published by Dr. Atlee,* I found that abdominal section had been performed for ovarian tumours, real or supposed, 101 times. If we extract from this list cases where the operation was not completed, and those on the point of death before the operation was begun, we shall have ninety remaining, in all of which the tumour was excised. Of these sixty-two recovered and twenty-eight died. Thus, whatever might be thought of the correctness of the statistics, the broad fact still remained, that an ovarian tumour had been extracted from living women in sixty-two cases with perfect success. An acquaintance with the structure and mode of development of these growths must convince us that the only other possible mode of cure is by rupture of the cyst, and then only under particular circumstances. This is an occurrence of extreme rarity, and yet, were we to be guided by the opinions of those surgeons who refuse to perform ovariotomy in any case, no other termination is to be expected, and the disease, notwithstanding the facts previously stated, is to be considered as irremediable by art. But every case must stand upon its own merits, and when all the circumstances of the one detailed are taken into consideration, the perfect diagnosis that was established, and the probability of a speedy fatal termination (a probability afterwards rendered certain by the suppuration discovered to exist within the cysts), it must be granted that the operation, if admissible at all, was so in this instance.

An important practical question presents itself in regard to the treatment after the operation, on which there was a difference of opinion among the practitioners who witnessed the case and dissection, viz. How the cavity or pouch containing pus, between the uterus and rectum, and the sinus leading from it up to the diaphragm, were connected with the pressure made on the abdomen by the many-tailed bandages and compresses, in order to direct the matter towards the external opening. Some have thought, that the pressure employed, instead of directing matter downwards, may have forced a portion of it upwards; while others are inclined to believe, that if the pressure, which latterly was much relaxed, had been more steadily continued, the formation of that cavity and sinus might have been prevented. The question is important, however, rather in reference to the proper treatment of future cases, than to the fatal event of this case; for the symptoms of ileus and the death of the patient were obviously dependent on the constriction of the portion of ileum above noticed by a band of lymph which was at the distance of some inches from any part of the wound, and had no connection either with the cavity or the sinus.

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* American Journal of the Med. Sciences, April 1845.

Although various lesions were found after death, their origin and connection with each other will easily be understood from a perusal of the case, and of the *post mortem* examination.

Notwithstanding the unsuccessful termination of this case, I am still of opinion that ovariotomy is warrantable *when the diagnosis of the tumour is certain, and the other circumstances favourable.* The more frequently it is performed the more readily will experience dictate the avoidance of many errors that even now encumber the practice of it. When once recognised as a legitimate mode of treatment, and only performed in appropriate cases, there is every reason to hope, from the experience of the past, that the degree of mortality which has hitherto accompanied it will gradually diminish. Before such a result can be hoped for, however, it is necessary that our notions of the pathology and diagnosis of the disease should be improved. To these points I shall refer afterwards.

CASE CL.*—*Ovarian Dropsy—Spontaneous Ulcerative Opening of the Cyst into the Bladder and Evacuation of its Contents—Recovery.*

HISTORY.—Anne Pyper, a servant, æt. 25, was admitted Nov. 8, 1848. She had been delivered fourteen days previously of a male child in the Maternity Hospital, the labour being a natural one, and presenting nothing unusual. On the birth of the child, however, the abdomen still continued enlarged, and at first led to the suspicion that another fœtus remained in the uterus. After a time, the true nature of the case was rendered manifest, and a large swelling was detected, which was movable to a certain extent, and presented all the characters of an encysted tumour of the left ovary.

SYMPTOMS ON ADMISSION.—The abdomen was swollen to about the size usual during the sixth or seventh month of pregnancy. The tumour extended from the epigastrium to the pubes, but bulged considerably towards the left side. Its surface was irregular; and two large nodules, each the size of a cocoa-nut, existed about its centre. It was tense and firm to the feel, somewhat elastic, but no fluctuation could be detected. The tumour was firmly fixed, and the seat of constant pain, especially in the left lumbar region, which was increased by pressure, by lying on the right side, or on assuming the erect posture. The urine was of a slight yellow colour, and presented its normal characters. The digestive, respiratory, circulatory, nervous, and integumentary organs appeared to be healthy. She had observed the tumour seven months before her delivery; and it has gone on gradually increasing, and been somewhat painful from the first. *Eight leeches were ordered to the most painful part of the abdomen.*

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* Reported by Mr. James Struthers, Clinical Clerk.

PROGRESS OF THE CASE.—For four days the patient remained in the same condition, the local pain, however, having been relieved by the leeches. On *Nov.* 12, my attention was directed to the urine, which now presented a copious white deposit, occupying two-fifths of the jar, while the supernatant portion was of a light amber colour, and unusually viscid. The deposit was determined by the microscope to consist of pus, mingled with a few granule corpuscles. The clear portion was strongly coagulable by heat and nitric acid. At first it was imagined that the cyst had burst into the vagina, but the patient and nurse concurred in saying that there was no discharge between the intervals of micturition, and that all the fluid came from the bladder. The urine presented the same characters for the next three days; the amount discharged during the twenty-four hours being about three pints. On the 15*th*, the tumour had somewhat diminished in size, its hardness and tensity had disappeared, and distinct fluctuation was perceptible in it. *A broad flannel roller was ordered to be applied firmly round the abdomen, and compression made by means of pasteboard, previously soaked and modelled to the abdominal surface.* From this time, the abdomen rapidly diminished in volume, while the amount of purulent viscous fluid discharged from the bladder varied from three to five pints in the twenty-four hours. The appetite and general health continued good; and she was ordered nutritious diet, with four ounces of wine daily. On the 23*d*, the amount of pus contained in the urine was greatly lessened, and the clear portion presented only a slight haziness on the addition of nitric acid. On the 27*th* the abdomen had regained its natural size, although a dense mass, evidently the collapsed ovarian sac, could readily be distinguished, occupying the left iliac and hypochondriac regions. The urine now also was natural in quantity, and presented only a slight sediment, consisting, as shown by the microscope, of some crystals of oxalate of lime, and a few pus globules. From this period she may be said to have recovered. She suffered occasionally from uneasy feelings on the left side, sometimes amounting to pain, which were relieved by the application of four leeches, followed by a small blister. One of the leech bites ulcerated superficially, but soon healed up. She was dismissed on the 18*th of December*, expressing herself as being well in every respect, having been sitting up and running about the ward for the fortnight previous. The indurated mass in the left iliac region was greatly diminished in size, but still very perceptible to the feel, though not to the eye.

Commentary.—The history of this case can, I think, only lead to one conclusion, namely, that an ovarian encysted tumour was present on the left side; that the individual cysts had, if not altogether, at all events for the most part, broken down to form one large cavity; that the contents of this cavity had suppurated, and a fistulous opening, formed either into the ureter or bladder (most probably the latter), through which the contained fluid was evacuated, permitting collapse of the sac and cure of the disease. The permanency of this cure would depend upon, whether all the secondary cysts had been ruptured and were broken down before the fistulous opening took place. This is a point which it was impossible to ascertain with certainty; but a careful examination of the woman before she left the Infirmary, convinced me that no rounded nodules or cysts could any where be felt.

The only instance I am aware of, in which an opportunity presented itself of dissecting an ovarian encysted tumour some time after its spontaneous rupture, was in an individual I saw examined by the late Dr. Makellar.—(*Monthly Journal*, Jan. 1847, p. 558.) In that case the cavity of the cyst was almost obliterated, and its walls were thickened and of cartilaginous hardness. A fistulous opening, however, was kept up between the tumour and the abdominal walls, below the umbilicus, where it had burst, and the patient sank from the continued discharge. How far a communication with the external atmosphere in this instance, and the presence of chronic peritonitis, may have operated unfavourably, I do not know; but the total cessation of all discharge, and absence of these circumstances in the case related, augurs well for her permanent recovery.

Whether a fistulous communication between the ovarian sac and urinary passages be favourable or not, is uncertain; for I have been unable to discover any recorded case in which this has ever happened. Many instances are to be met with where similar cysts have burst into the peritoneum, the fluid been absorbed, and excreted in large quantities by the kidney as urine. Other cases are to be met with, where the contents of the tumour have burst externally by ulceration through the abdominal walls, or into the vagina, or into the intestines; but in none, so far as I am aware, previous to the one now related, have the contents of the tumour been evacuated directly as a purulent viscous fluid from the bladder, proving a direct communication with that organ.

CASE CLI.*—*Ovarian Dropsy which gradually emptied itself by Spontaneous Openings through the Fallopian Tube—Singular attempt at Imposition of Pigs' Bladders, for Cystic Formations in the Uterus.*

HISTORY.—Elizabeth Allan, æt. 43, servant, a tolerably stout healthy-looking woman—admitted September 30th, 1852. States that she enjoyed good health up to the year 1829, when she experienced a lingering *post partum* recovery. In 1830 her abdomen commenced to swell; she was tapped, and 190 oz. of fluid removed. For six years she was under medical treatment; but then (1836) she had so far recovered that she was once more able to follow her usual occupation. In 1841 the abdominal swelling returned, and continued till 1848. At the beginning of that year, the abdomen being greatly swollen, she felt something give way, followed by intense burning abdominal pain, and a copious discharge of an opaque fluid from the vulva. The pain subsided in a few days, and some weeks afterwards she was much better, and was enabled to get out of bed. She says the same thing has happened upwards of twenty times since, at various intervals; the last occurred on the 27th of August 1852. She also states that about seventeen cysts or polypi have at different times been removed from the uterine passages—their removal being preceded by bearing-down pains. During all this time the catamenia have appeared regularly, and lasted, on an average, from eight to ten days. She further says, that for the last twelve years she has had repeated attacks of hæmatemesis. In 1852, her attention was drawn by her medical attendant to a bulging beneath the left clavicle, where she has frequently experienced a deep-seated pain of a burning character, with a sense of a trembling or vibratory movement.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Symptoms on Admission.—On admission, the patient complains of uneasiness and pain in the lower part of the abdomen, and of frequent tympanitic distension. On examination, the abdomen presents the appearance of a woman in the sixth or seventh month of pregnancy—is everywhere tympanitic on percussion, but on palpation there is an undefined fulness and induration in the left iliac and hypochondriac regions—no pain on pressure when the patient's attention is directed from the part. The left side of the chest appears fuller than the right side, but expands well on inspiration. No dulness on percussion; respiratory sounds normal; no cough or pulmonary symptoms. Below the acromial extremity of the left clavicle, a loud blowing murmur can be heard over the subclavian artery, which is inaudible on the right side. Circulatory, digestive, urinary, and integumentary systems otherwise normal.

Progress of the Case.—The patient complained of tympanitis and pain, for which she was treated by occasional purgatives, enemata, carminatives, and antispasmodics. On the 6th of October, I requested Dr. Simpson to examine her per vaginam. He found the cervix uteri about three quarters of an inch in length, increased in thickness and density. The os uteri was patulous, and admitted easily the first phalanx of the index finger. The edges were rough. The body of the uterus was mobile, but its volume was increased. The left ovary was enlarged, and the rectum distended posteriorly. At this time the patient expressed her opinion that a discharge of fluid was about to take place. Nothing occurred, however, until the 5th of November, when, a little before five o'clock P.M., rising to micturate, she felt something give way in the lower part of abdomen, and about 50 oz. of fluid escaped on the floor. A small quantity was carefully collected, and was found to consist of slightly opalescent serum, of sp. gr. 1005, slightly coagulable by means of heat and nitric acid. On introducing the uterine probe, the cavity of the uterus measured three inches and a half in length, and contained nothing abnormal. Nothing unusual followed the discharge of fluid. On the *28th of December*, there was also a considerable watery discharge.

During all this time she continued to complain of vague abdominal pains, which were evidently feigned. She was carefully watched, and no cysts had come away. On the *4th of January* she expressed herself so well that she was desirous of going out. Feeling satisfied that this request on her part was to procure the means of imposition, permission to go out was granted, and Mr. William Calder, one of the clinical clerks, agreed to follow her. She went straight to the market, and was seen after making inquiries of one or two butchers to purchase a pig's bladder. Three days afterwards, *January 7th*, I was shown at the visit a macerated piece of this bladder, which she affirmed had been passed during the night, and was a portion of a ruptured cyst. According to her own account there had been violent bearing-down pains for three nights previously. I proceeded to inspect the substance, and on informing her that it was a piece of pig's bladder, her astonishment and alarm may easily be conceived. She subsequently confessed this imposture, but nothing could induce her to communicate anything with regard to her former ones.

Commentary.—In June 1852, I received from a highly respectable practitioner in the north of Scotland, a bottle containing several cysts, with a letter informing me that they had been passed *per vaginam* by this woman then labouring under ovario-uterine disease. He wrote that "The patient, about eighteen years ago, had a mature child. Her labour was followed by an attack of peritonitis, and she dates her present ailments from this period. Before the case came under my care, she had been long in hospital for ovarian dropsy, and was there repeatedly tapped. During the last few years she has passed *per vaginam* from time to time, one of the membranous productions of which I herewith send you specimens. You will perceive that in some instances they were perfect casts of the interior of the uterus ; in others they have been broken in the removal. When she first applied to me, the paracentesis had been delayed beyond the usual time. The dropsical accumulation was great, and her general health in a very unsatisfactory state for surgical interference ; and before I could make up my mind to operate, nature kindly came to the relief of doctor and patient, and managed the thing so well that I have allowed the good dame to have everything her own way since. She did it thus : a membranous cyst was thrown off, and this was immediately followed by the discharge *per vaginam*, of the dropsical fluid, to the amount of several pints. That this also came from the uterus, I satisfied myself by tactile examination whilst the fluid was passing. Since then this process, the discharge first of the membrane (distended with serum), and immediately after of the effusion, has been repeated every few months, the patient in the interval enjoying an astonishing measure of health."

Without entering into a minute description of these cysts, it will suffice to say, that after carefully examining them, I came to the conclusion that they were the urinary bladders of some animal—and from their size (between two and three inches in their long diameter), perhaps of lambs or small pigs. They had evidently been macerated, and the external and half of the muscular coat removed, and the smooth mucous surface turned inside out. In some of them, however, there could be seen the two openings of the ureters, whilst in others fragments of one or both tubes were still attached. On communicating my opinion as to the nature of these cysts to her medical attendant, and hinting that so far the woman was an impostor, he replied as follows :—

"I removed two or three of the membranes, on as many different occasions, from the vagina, and the state of the os uteri, as ascertained on their removal, was always such as to leave no doubt in my mind as to their having been ejected from the uterine cavity. On each occasion the woman suffered severely, having had regular and painful uterine contractions, till the diseased product was expelled, and profuse hæmorrhage afterwards generally inducing syncope. I mentioned in my former note that I have more than once felt the dropsical fluid (which, as I also stated, is generally discharged shortly after the sac) passing from the os uteri. Add to this that the woman's circumstances are such that it would be next to impossible for her to procure the means of perpetrating the trick you suspect her of. The membranes were kept by me for years immersed in spirits. May not this circumstance have rendered your examination of them less satisfactory."

In this letter my correspondent announced his intention of sending the woman to Edinburgh, if I would take her into the Clinical Ward of the Infirmary. This I promised to do, and having passed another "cyst" in the interval, she came to Edinburgh.

On reviewing the facts of this case, it appears probable that cystic disease of the left ovary had burst at successive times into some portion of the left Fallopian tube, and so been gradually emptied; and that with a view of exciting further sympathy, she had introduced the macerated urinary bladders of lambs, sheep, or pigs into the vagina, and pretended that they had been formed in the uterus.

Pathology of Ovarian Dropsy.

The subject of encysted tumours of the ovary has been considerably elucidated by numerous writers, but more especially by Hodgkin, Seymour, Bright, Cruveilhier, and Müller. From these it would appear that the ovary may be the seat, 1st, of a simple cyst; 2d, of a compound cyst, formed of a capsule containing a number of secondary cysts; and 3d, of similar cysts more or less combined with a sarcomatous structure, generally considered of a malignant nature. The first of these seldom becomes larger than an orange, and is for the most part only detected after death. The two latter frequently reach a large size, and contain several gallons of fluid, constituting what has been called ovarian dropsy. In these cases, the accumulation of fluid sooner or later interferes with the process of respiration, so as to render paracentesis necessary. This operation is repeated again and again at shorter intervals, until the patient sinks. On dissection, death is found to have been occasioned by peritonitis, by suppurative inflammation within the sac, or by exhaustion.

The source of the fluid, removed by tapping in ovarian dropsy, was pointed out by me in 1846.* On some occasions the serum exists within the cavity of the abdomen, and the tumour can be felt to move or float in it. At other times it is confined within the cystic tumour. Thus some have supposed the fluid to be ascitic, caused by pressure on the large abdominal veins, whilst others have supposed that the growth irritates the peritoneum, and occasions an increased effusion of serum. In the case of Fleming (Case CXLIX.), it was also argued by some of the objectors to ovariotomy, that excision of the tumour would not remove the ascites, as that was probably dependent on causes unconnected with it. Now, in that and similar cases, where four or five gallons have frequently been removed from the abdominal cavity, it must be evident that the amount of fluid would not be contained in the cysts of a tumour only the size of the human head. Neither could it have been the result of peritonitis, as the fluid was clear and of a brownish amber colour. Again, the liver and other abdominal viscera were healthy, and they could not have caused venous obstruction; nor is it likely that such an ovarian tumour, floating as it did mostly in fluid, could by its pressure, have occasioned effusion of that fluid from the veins. It must be concluded, therefore, that the fluid is secreted within the tumour, and passes through one or more openings in its walls into the peritoneal cavity.

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* Pathological and Clinical Observations on Encysted Tumours of the Ovary. Edinburgh Medical and Surgical Journal. Vol. lxv.

The mode of growth and the structure of encysted tumours of the ovary.—In all the specimens of the disease I have examined, when the growth is only the size of a walnut, or is so large that it has entirely filled the abdomen, the original form and structure of the ovary has disappeared. Whether a new growth is produced, or, as has been supposed by some, the Graafian vesicles are enlarged, and thus originate the tumour, is not yet determined. I am inclined to adopt the latter opinion, and to think also that the external capsule is formed by the thickening and extension of the serous membrane which covers the organ. Sooner or later the enlarged ovary is found to consist of a dense fibrous envelope or sac, containing internally numerous secondary cysts attached to its walls. As the tumour developes itself these cysts become larger, more numerous, and crowded together. Each individual secondary cyst contains a clear glairy or gelatinous fluid, and is composed of a firm fibrous capsule, lined by a smooth membrane. On making a thin section completely through one of these cysts, its greatest thickness will be found, on a microscopic examination, to be composed of fibrous tissue, lined internally by a delicate membrane covered with epithelial cells. (See Figs. 175, 176.) The whole are richly supplied with blood-vessels.

As the tumour enlarges, it ascends from the pelvis, where it was originally confined, and occupies more and more of the abdominal cavity. The Fallopian tube and broad ligament become elongated. The fimbriated extremity of the former is sometimes obliterated, at others stands out from the morbid mass. Sometimes the tumour forms adhesions externally, more or less extensive to the peritoneum, omentum, colon, or neighbouring viscera. At others it floats loose in a fluid within the abdominal cavity.

Meanwhile the internal cysts press upon each other, they become distended with fluid, the blood-vessels are compressed, and in such places further growth is checked. In consequence of this, absorption of their structure occurs, and one or more open into each other, as was pointed out by Hodgkin, constituting a multilocular cyst. Occasionally the pressure acting upon the external sac causes it to become thinner and thinner, until at length perforations are produced in it also, through which the fluid contents of the cyst escape into the abdominal cavity. Thus relieved from pressure, the margins of these perforations become once more vascular, and of considerable thickness, often resembling the round perforating ulcer of the stomach so well described by Cruveilhier. Under such circumstances, the internal membrane of the cyst continues to secrete, and pour its fluid into the peritoneum, rendering paracentesis necessary. At other times no opening in the sac takes place, the secondary cysts burst or open into each other internally, so that, after a certain period, three, two, or only one cavity may remain, with bands stretching across, forming imperfect septa in, or a few small cysts, attached to the internal wall, clearly indicating its original structure. In either case, sooner or later, suppuration is in most instances established within one or more cysts, or within the external sac itself. This suppuration seems to occur in some cases by the formation of pus corpuscles in the gelatinous matter; in others by inflammation taking place in the walls of the cyst or sac, leading to exudation, which is afterwards converted into pus. The patient does not long survive this occurrence. If perforation have taken place in the external wall of the tumour, peritonitis is generally induced; if not, the patient sinks exhausted, whether the pus be evacuated or no. Occasionally more or less blood is extravasated into the inflamed cysts, which, with the various stages of suppuration, cause the sanguinolent, coffee-like, greenish, or purulent fluids so often observed.

The gelatinous contents of the cysts vary greatly in different cases: in some being diffluent, in others glairy like white of egg, whilst in many it is semi-solid, resembling coagulated calf's-foot jelly, or strong size. When fluid, it frequently contains flocculi, which are patches of epithelial membrane, more or less united together by granular matter. When gelatiniform it often contains faint oval corpuscles, or a few primitive corpuscles. (See Figs. 172, 173.) Occasionally an opalescent or opaque creamy appearance is communicated to the jelly by the formation of pus corpuscles or minute granules (Fig. 281), and sometimes it is wholly filamentous, mixed with granule cells and other products of inflammation.

This jelly-like matter when consistent presents all the characters of coagulated *liquor sanguinis*, which has not yet passed into organisation. Acetic acid developes in it, or causes to be precipitated, a white membrane having all the characters of fibrous tissue. Frequently granules, cells, and filaments may be observed in it in various stages, as is the case with recent exudation from the serous membranes, or in other simple forms of hyaline blastema.

Not unfrequently the ovary contains hairy and other growths, teeth (p. 174), and calcareous deposits, and may be the seat of cancer. In this last case I also pointed out and figured in the memoir referred to, that the so-called cancer often consists of an epithelioma of a remarkable kind, columnar epithelial cells forming and separating in great abundance.* I have now examined several such diseased ovaries, one especially forwarded to me by the late Mr. Russell, of Birmingham, exhibited to the naked eye all the characters of cystic encephaloma, yielding an abundant milky juice. On examining this with a microscope, it was seen to contain, 1st, numerous columnar epithelial cells, with fatty granules accumulated within their broad extremities; 2d, a multitude of diaphanous celloid bodies; and, 3d, numerous free nuclei, as in Figs. 409, 410, 411. See also Fig. 177.

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* Ibid, Case II. Fig. 1.

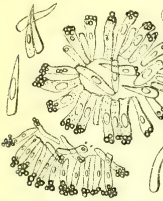

Fig. 409.

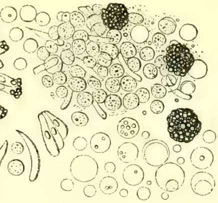

Fig. 410.

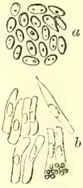

Fig. 411.

The diagnosis of ovarian tumours was formerly very defective; so much so, indeed, as in some cases to have led to the opening of the abdomen to excise a tumour which had no existence, and in many others to the performance of an operation when, from adhesions or other causes, the growth could not be removed. In all cases of abdominal tumour, there are two questions which every practitioner desires to answer with certainty, namely, 1st, What is the *seat?* and, 2d, What is the *nature* of the tumour? With regard to the first point, I must refer to obstetrical works, in which all the circumstances, local and general, are pointed out, which distinguish such ovarian growths from pregnancy, with which they have often been confounded. Therein also will be found the means of exploring the cavity of the uterus with the uterine sound, an instrument which, by enabling the practitioner to elevate, depress, or bring forward, the fundus of the organ, so as to permit of its being felt through the integuments, in various positions above the pubis, affords most valuable information.

In cases of ovarian dropsy, the information thus arrived at is negative, but this becomes of immense importance when the question arises (as it always does), Is the tumour uterine or ovarian? In the case of Fleming, this point was anxiously debated, but when on the introduction of the sound the fundus of the uterus could be distinctly felt above the pubis presenting its usual rounded character, there could no longer be any suspicion that the tumour originated in that organ. Again, by pushing the uterus from side to side, we are enabled to act upon the ovaries, and to determine, by the impulses communicated to the hand, whether the tumour be on the right or left side, and to form a tolerable idea, in certain cases, whether it be free or attached. By

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Fig. 409. Groups of columnar epithelium in the juice of an encephalomatous cystic growth of the ovary, with fatty granules accumulated at their extremities.

Fig. 410. Diaphanous celloid bodies, naked nuclei, and granule cells.

Fig. 411. *a*, The nuclei after the addition of acetic acid; *b*, the columnar epithelium acted on by the same reagent. 250 *diam.*

means of this instrument, then, we are materially assisted in resolving the first important question regarding the *seat* of the tumour.

A microscopic examination of the fluid removed by paracentesis may also sometimes give important indications as to the *nature* of the tumour. If, for instance, the fluid be clear, with polygonal or rounded and swollen epithelial cells (see Figs. 76 and 175,) they are highly characteristic of cystic ovarian growths. If columnar epithelial cells are found in quantity, there is probably an epitheliomatous cancroid of the ovary (see Figs. 177, 409, and 410). If, on the other hand, there be pus or blood corpuscles, areolar texture, or calcareous salts and deposits, the amount of purulent formation, hæmorrhage, disintegration, or mineral degeneration, may be judged of.

Treatment of Ovarian Dropsy.

The anatomical examination of encysted tumours of the ovary must convince any one that they are not curable by internal medicines. The idea that a dense fibrous envelope, containing numerous secondary cysts, all richly furnished with blood-vessels, can be absorbed through the agency of mercury, iodine, or any other drug, must be purely imaginary. There is not one positive fact to support such an opinion. Neither can it be supposed, from what has been described of the mode in which these tumours are developed, that so long as any of the secondary cysts remain intact, a cure can be hoped for. But we have seen that the natural course of these secondary cysts is to open into each other, until at length only one large cyst remains. Under such circumstances it may be conceived that a rupture might, by exciting inflammation, and thus destroying the secreting surfaces, or inducing adhesions between them, cause a radical cure of the disease. Such is probably the explanation of those rare cases, well established in science, which have apparently burst, and rapidly disappeared. A case of this kind has been recorded by Lebert,* in which the tumour burst into the peritoneum and subsequently disappeared. In other cases the tumour may unite with neighbouring hollow viscera, and by ulceration empty its contents into them, so that they are discharged (Cases CL. and CLI.), or it may open on the external surface. When a perfect cure has been brought about in this way, it will generally be observed that the progress of the morbid growth has been chronic, that consequently time has been allowed for all the secondary cysts to open into each other, and that the inflammation which follows the rupture may then be supposed to act by obliterating or causing adhesions between the walls of the cyst, as in the case of hydrocele. When, on the other hand, sudden rupture of the external sac takes place, whilst some of the cysts remain entire, the termination in cure is impossible, and the peritonitis occasioned more frequently causes death.

The occasional occurrence of such spontaneous recoveries has led to the proposition of producing permanent artificial openings, with a view of imitating a natural cure. Mr. Bainbrigge of Liverpool suggested making an incision into the sac, and uniting its edges with the external wound; and Dr. Tilt of London has proposed making a minute aperture by means of Vienna paste, so as to cause a permanent opening. Such practice can only be useful at a particular period in the growth of ovarian tumours—that is, when all the internal cysts have broken down into one. But such cases are exceedingly rare, and such practice can be of no real advantage until we learn to distinguish in the living subject unilocular from multilocular cysts. Numerous cases and dissections of ovarian tumours have convinced me, that in the present state of the art this knowledge is not to be arrived at with any degree of certainty; and that consequently any proposal, however valuable in itself, which is founded upon the assumption of our possessing that knowledge, is not likely to be practically beneficial. The same remark applies to injections of the Tr. of iodine or any other fluid, which can only operate on individual cysts, and not on the entire growth.

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* Physiologie Pathologique, tome ii. p. 71.

It is astonishing how some individuals accommodate themselves to very large abdominal swellings. I have known several cases where the patient has laboured under an enormous encysted tumour of the ovary for ten and even fifteen years. On the other hand, many facts demonstrate that when once paracentesis is had recourse to as a palliative measure, suppuration within the cysts, and a cachectic state of the constitution is more likely to supervene. One important practical rule, therefore, to be followed in the treatment of these cases is, not hastily to have recourse to tapping, but by all possible means of delay, to further the natural disposition which the internal cysts exhibit, under pressure, of forming one large sac. This once accomplished, there is nothing inconsistent in supposing that inflammation produced artificially is capable of producing a permanent cure as well as a spontaneous rupture. There is every reason to believe that artificial pressure is capable of facilitating the absorption of the walls of the secondary cysts, and their opening into each other; but we possess no means of ascertaining when only one sac is produced. That it has succeeded in obliterating and ultimately curing the disease, however, has been proved by Mr. Isaac Brown,* who by binding a book on the tumour firmly, causing inflammation and breaking down of the internal cysts, and then letting out the pus, has actually cured some cases. The practice, however, is by no means safe.

Case CL. seems to me illustrative of the effects of pressure. It must be acknowledged that the seven months which had elapsed between the time the tumour was first perceptible, and the period when it spontaneously burst into the bladder and collapsed, was a remarkably short one. In the most favourable cases this result takes about two years to accomplish by itself; but in the instance of Pyper, the tumour was subjected to the gradually increasing and equable pressure of the pregnant uterus, and to its influence must, I think, be attributed the fortunate result and rapid breaking down of the secondary cysts. The ulceration into the bladder was probably determined by the direction the pressure had assumed in this case, and, of course, could not be imitated artificially.

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* See cases recorded in the Lancet.

There still only remain two methods of curing an ovarian dropsy by art—viz., 1st, by excision; and 2d, by pressure followed by puncture. Cases CL. and CLI. confirm the views suggested by pathology with regard to the *modus operandi* of the latter treatment; and if, in cases which do not admit of extirpation, pressure be so gradually and equably applied as to obliterate the internal or secondary cysts, an artificial opening then made would cure the disease. The difficulty is to ascertain when the moment for making the puncture has arrived—in other words, when a multilocular is converted into a unilocular cyst. In the present state of the art, this, as I have said, is impossible; but as an exact indication of the difficulty is often the best preliminary to its removal, I do not despair of some day seeing it completely conquered by the cultivators of medicine.

As regards excision, the practice of late years has tended to confirm its propriety in such cases as that of Fleming (Case CXLIX.), in which the tumour has no adhesions of any extent to the abdominal walls, where its presence is the cause of great deformity and much suffering, and where the youth and general health of the patient, and freedom from other diseases, hold out hopes of a favourable result. Dr. Clay of Manchester has recently stated that he has operated in 79 cases of ovarian tumour, 55 of which have been successful, and that he is confident that operating *de novo*, from his increased experience, he would not have more than 25 per cent. of fatal cases.

NEPHRITIS AND PYELITIS.

Case CLII.*—*Acute Nephro-Pyelitis—Recovery.*

History.—Helen Kessick, æt. 65, a nurse—admitted November 25, 1852. States that, for the last twenty years, she has been subject at intervals to occasional pains in the lumbar region. She had never experienced any difficulty or uneasiness in micturition, till about five years ago, when she noticed that the urine was tinged with blood; this was accompanied with pain in the right lumbar region, preceded by shivering, and followed by febrile symptoms. She was admitted into the Royal Infirmary, where she remained for seven weeks, and was dismissed cured. She had no return of the symptoms, till about twelve months ago, when she was again seized with shivering, and a return of the lumbar pain. During the summer the urine was tinged with blood for two days, but afterwards again became normal, and she continued better till about four weeks ago, when she once more experienced pain on passing water, which, with increased uneasiness in the lumbar region, has continued up to the present date.

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* Reported by Mr. F. B. de Chaumont, Clinical Clerk.

Symptoms on Admission.—On admission, tongue much furred; appetite bad; great thirst; no nausea; complains of pain in the epigastric region, but no tumour or hardness can be detected; bowels have not been opened for two days. She has considerable pain in right lumbar and both hypochondriac regions, also in hypogastrium, after making water, which is passed in less quantity than usual. Urine sp. gr. 1016, coagulable by heat and nitric acid, and deposits, on standing, a copious ropy mucus-like sediment, showing, under the microscope, large quantities of pus globules, and a few crystals of triple phosphate; pulse 76, soft; no palpitation of heart; complains of occasional headache with frequent giddiness, and muscæ volitantes; sleeps ill at night, and complains much of cold feet; other functions normal. ℞ *Liquor. Potass.; Sp. Æth. Nit.* āā. ʒij; *Sol. M. Morph.* ʒiii; *Mist. Camph.* ℥v. M. *Sumat* ℥ss *quarta quaque hora.* ℞ *Ol. Ricini* ℥j. *Sumat statim. To use barley water as a drink.*

Progress of the Case.—*December* 4.—Feels very weak; continues otherwise in much the same state; urine still albuminous, with copious deposits, containing pus and triple phosphates. *To have* 3 *oz. of wine. Dec.* 11.—Continued to improve till last night, when she was seized with shivering and pain in lumbar and epigastric regions; great nausea and vomiting; tongue moist, but much furred; great headache; urine as before. *Omit. Mist. Potass., etc. et Vinum.* ℞ *Sol. Antimon.* ʒiij; *Spt. Æth. Nit.* ʒj; *Sol. Acet. Ammon. et Aquæ* āā. ℥iiss. M. *Sumat* ℥ss *ter indies. Warm fomentations to be applied to the loins. Dec.* 13*th.*—Was rather better yesterday, but has still pain in right lumbar region. To-day she is still sick, the pain in right lumbar region somewhat increased; there is great dysuria; the urine is of high colour; still albuminous, sp. gr. 1018, with copious sediment, showing, under the microscope, numerous blood globules, and a quantity of debris of cells mixed with the pus and triple phosphates, which are still as abundant as formerly. *Dec.* 15.—Was no better yesterday, and began to complain of severe pain in the hypogastrium. *Omit. Mist.* ℞ *Tinct. Hyoscyam.* ʒss; *Sol. M. Morph.* ʒiss; *Mucilaginis* ℥ij; *Aquæ* ℥iii. M. *Sumat* ℥j *ter indies.* To-day she still complains of the pain in hypogastric and lumbar regions. The urine is diminished in quantity, and deposits, on standing, a viscid tenacious sediment, which, in addition to the blood corpuscles, pus, and triple phosphates, now shows casts of the urinary tubes, crowded with granules. *To be cupped on the lumbar region to* 8 *oz. Dec.* 16*th.*—Only 6 oz. were obtained by the cupping. The pain in back is much relieved, and she is able to sit up in bed without uneasiness, but there is still pain in the hypogastrium; pulse 72, soft; tongue still furred; no nausea or vomiting, but some pain in the bowels; headache nearly gone; urine of a dirty red colour, still coagulable; showing blood, pus, and phosphates under the microscope as before. *Habt. enema domesticum et sumat Sol. Mur. Morph.* ʒss; *Mucilaginis* ʒj *ex aqua hora somni. Dec.* 18*th.*—Symptoms much the same as at last report. Urine sp. gr. 1015, and again shows casts of the urinary tubes. The bladder was sounded to-day, but nothing abnormal could be detected. *Dec.* 20*th.*—Urine contains a large quantity of gelatinous mucus, in which a few broken down granular casts can be detected, ℞ *Sol. Mur. Morph.* ʒss; *Tinct. Hyoscyam.* ʒi; *Mucilaginis* ℥j; *fiat Haust. quaque nocte sumendus.* ℞ *Decoct. Uvæ Ursi* ℥x; *Tinct. Hyoscyam.* ℥j; *Spt. Æth. Nit.* ℥j; *Mucilaginis* ℥ij. M. *Sumat* ℥i *ter indies. Dec.* 26*th.*—Continues in much the same state, but the pain in hypogastrium has considerably increased. She had some sweating last night, and the pulse is now 86 and soft; the tongue is still furred; no appetite; great thirst; bowels not open for some days; great dysuria; urine presents the same characters as before. *Applic.*

hirudines quatuor hypogastrio et postea bene foveatur. ℞ *Pulv. Jalapæ et Pulv. Scammon.* āā. gr. vi. M. *Sumat hora somni.* ℞ *Sol. M. Morph.* ʒss; *Mucilaginis* ℥j. M. *Sumat cras mane. Dec. 29th.*—The pain in hypogastrium having greatly abated, the leeches were omitted at the patient's request; the bowels were well opened by the medicine. To-day she feels much better, and slept well without the draught. Tongue more clean and moist, but the urine contains rather more blood. *January 1st*, 1853.—She still continues improving, but pain in hypogastrium is not quite gone. The urine is more natural in colour, the deposit greatly decreased, and the blood has now disappeared. *March 9th.*—Since last report has experienced occasional lumbar pain, but on the whole has been slowly getting well. The urine, which has gradually been getting clearer, is reported to-day as quite normal, and free from albumen. A slight hernial protrusion has been discovered in the right iliac region, to which a truss was applied. *March 28th.*—Dismissed relieved of all her symptoms.

Commentary.—This was a case of acute nephritis, with tendency to recurrence, exhibiting local pain, inflammation of the mucous membrane (pyelitis), as shown by the excessive discharge of mucus and pus, and inflammation of the secreting substance of the organs, as proved by the frequent appearance of blood, casts of the tubes and the persistent albumen. During a period of four months, however, during which a variety of treatment was had recourse to, as recounted in the report, all the urinary symptoms disappeared, although there was still a tendency to the return of pain in the lumbar region. This case indicates the mode in which acute diseases of the kidney frequently pass into chronic ones; but from the circumstance that the right kidney only was attacked, and that the left one could still secrete a sufficient quantity of urine, no œdema or dropsy occurred.

CASE CLIII.*—*Subacute Nephritis, with great Anasarca—Recovery—Acute Nephritis of Left Kidney—Recovery.*

HISTORY.—Anne Hewison, æt. 18, a servant—admitted Dec. 14th, 1856. She has been in the Surgical Hospital on three occasions during the last four months, on account of abscesses in and about the axillæ, from which she is now free. For six weeks she has experienced pain in the lumbar regions, most severe when the weather was cold, and increased by coughing and hard breathing. A fortnight ago she observed that the feet and abdomen were swollen. Since then she has become gradually anasarcous.

SYMPTOMS ON ADMISSION.—The integument all over the body is œdematous, and the face especially considerably swollen. All the depending parts of the trunk, together with the extremities, are pale, pitting readily on pressure. The catamenia have appeared on three occasions at the interval of a fortnight, and been very copious. The urine is highly albuminous, sp. gr. 1010, diminished greatly in quantity, but the exact amount cannot be ascertained. Numerous waxy casts are visible in it under the microscope. The chest is resonant everywhere on percussion. Sibilant sounds are audible at the apex of right lung, both with inspiration and expiration, the remains, she says, of a cold that has troubled her for five weeks.

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* Reported by Mr. M'Leod Pemberton, Clinical Clerk.

She suffers occasionally from palpitation ; but the circulatory system on examination is normal. Pulse 80, of good strength. The abdomen very tumid, with distinct fluctuation, and painful on pressure over the whole anterior surface, but most so on the right side opposite the lumbar region. The digestive system otherwise, and the nervous functions are normal. *Habeat Potass. Bitart.* ℈j *ter indies.*

Progress of the Case.—*December 16th.*—The amount of urine passed is greatly increased, and has amounted to 51 oz. during the last 24 hours. *Dec. 20th.* The whole body is now much less œdematous. Pulse 75. Passed 150 oz. of urine during the last 24 hours. *Dec. 25th.*—Has passed about 100 oz. of urine daily, which is pale, sp. gr. 1010, and now only faintly albuminous. Œdema of extremities has now disappeared ; but still some swelling of face and abdomen. There are slight febrile symptoms. Pulse 100, weak. Complains to-day of sore throat. The tonsils are enlarged, and the mucous membrane of fauces congested. *An astringent gargle was ordered, and warm poultices to be applied to the throat. Dec. 26th.*—Yesterday afternoon and to-day she passed urine of a dark brown colour. It is highly albuminous, with a sediment composed of urates and blood discs, as seen under the microscope. There is pain in the left loin. Throat not so painful. Face anxious. Pulse 90, of good strength. *To omit the bitartrate of potass.* ℞ *Sp. Æther. Nit.* ʒij ; *Mucilaginis* ℥ij ; *Aq. Font.* ℥vj. M. *Two table-spoonfuls to be taken every four hours ; warm fomentations to the left lumbar region. Dec. 28th.*—Has continued to feel pain in the left loin, which is increased on pressure. Has passed 24 oz. of urine during the last 24 hours, highly albuminous, less dark, and now of a light chocolate colour, turbid, with no layer of fat perceptible on repose, but numerous tube casts and some urates and blood corpuscles seen in it with the microscope. All sore throat, fever, and œdema of the integuments have now disappeared. Pulse 84, firm. *Dec. 31st.*—Has passed from 50 to 60 oz. of urine daily. Has still dull pain in the loins, but otherwise better. From this time she began to sit up and walk about the ward. The lumbar pains returned at intervals, but finally left her *Jan. 26th.* The urine also retained a trace of albumen for some time ; occasionally, however, disappearing for a day. On the *19th of Jan.* she took *Potass. Bitart.* gr. x. *ter indies.* The urine was examined daily, and on *Jan. 27th* up to the *30th* not a trace of albumen could be discovered. She was then dismissed, quite well.

Commentary.—In this case, a somewhat chronic form of nephritis or Bright's disease appeared before her admission, which occasioned intense general anasarca of the body, and was characterised by albuminous urine containing numerous waxy casts. The œdematous face and general appearance were in this girl highly distinctive of renal dropsy. The strong diuretic effects of the bitartrate of potass, in scruple doses, caused this to disappear. She was then seized with acute nephritis of the left kidney, as indicated by the febrile symptoms, pain in the left loin, increased on pressure, bloody and turbid urine, etc. From this also she gradually recovered under the employment of gentle diuretics, demulcents, and warm fomentations locally. All trace of tendency to permanent albuminuria—so common a sequela of nephritis—was also got rid of by the action of small doses of cream of tartar. The occurrence of sore throat and febrile symptoms with this last attack, induced me to inquire carefully as to whether there was any proof of scarlatina, but I could not discover any.

Case CLIV.*—*Acute Desquamative Nephritis, proving rapidly fatal from diminished flow of urine, general anasarca, and œdema of the lungs.*

History.—William Lawson, æt. 34, married, was admitted to the Skin Ward Nov. 28, 1856, for an attack of scabies, which has lasted four months. He confesses to have been drinking freely lately, is anæmic and emaciated. On examination, innumerable minute isolated vesicles are to be seen scattered over the whole body, with the exception of the head and neck; most abundant on the flexor surfaces. On the legs there are a few patches of eczema. *Dec. 2d.*—He was ordered to rub himself all over twice a day with simple lard, which, on the sixth, was exchanged for sulphur ointment.

Commencement of the Disease.—*Dec. 11th.*—Especial attention was directed to him to-day in consequence of cough and evident dyspnœa. He thinks he must have caught cold from being so long naked when employed rubbing himself. Since the 7th he has observed slight œdema of his feet, which was followed by cough. He has paid little attention to these symptoms. The urine is found to be highly albuminous and of brownish colour. On microscopic examination of the sediment, it was seen to contain numerous desquamative tube casts. His cough troubles him chiefly at night when he finds there is difficulty of breathing on lying in the horizontal posture. On percussion there is slight impairment of resonance over right chest anteriorly, below level of third rib. There is no increase of vocal resonance. The respiratory murmurs are more feeble than on the left side, and inspiration is occasionally sibilant. Posteriorly, percussion over lower half of both sides gives resonance of a somewhat flat tone. Fine moist sounds attend the close of inspiration, and expiration feeble below, is exaggerated superiorly. ℞ *Sp. Æther. Nit.* ℥ss; *Tr. Digitalis, Tr. Scillæ,* āā ʒiss; *Aquæ ad* ℥vj. M. *A table-spoonful to be taken every four hours.*

Progress of the Case.—*December 12th.*—Over dull region anteriorly moist sounds, clicking in character and few in number, attend the extreme close of inspiration. Vocal resonance also slightly increased in the area of dulness, and posteriorly there is slight comparative dulness over middle third of right side. Urine of brown smoky colour, with blood corpuscles visible under the microscope. Sputum scanty, purulent, not streaked with blood. *Extract* ℥iv *of blood from the loins by cupping. Omit the mixture. To have* ʒss *of Bitartrate of Potass three times a-day.* ℥ij *of Gin daily. Dec. 15th.*—Since last report the dyspnœa has been gradually increasing, and the pulse becoming weaker. It is now 100, and soft. The sputum is scanty, purulent, and not tinged with blood. Percussion over both lungs inferiorly and posteriorly is impaired, especially on the right side. On auscultation, a fine moist rattle accompanies the inspiration, and there is an increase of the vocal resonance. Urine presents the same characters as formerly, and contains chlorides in abundance, but does not amount to ℥xx daily. The gin is increased to ℥iij daily. To have ℥iv of port wine in addition. ℞ *Ammon. Carb.* ℈ij; *Tr. Card. Comp.* ℥j; *Aquæ ad* ℥vj; *ft. Mist. A table-spoonful to be taken every second hour. Dec. 17th.*—Has been steadily getting worse. The respirations are now 40 in the minute, and he is obliged to retain the sitting posture. Takes no nourishment. Pulse 126, very feeble. Crepitation and increased vocal resonance now heard posteriorly as high as spine of scapula. No pain. Pulse 80, of good strength. No chlorides in urine. To be dry cupped over chest and back; warm bottles to feet. Towards evening the face more pallid, hands and forearms cold and slightly œdematous. At 9 p.m. the breathing was 48 per minute, and so laboured that he was bled to about

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* Reported by Mr. Wm. Guy, Clinical Clerk.

℥xiij. Toward close of venesection the pulse at left wrist, previously imperceptible, could be detected small and exceedingly weak; and patient (on inquiry) admitted himself to be slightly relieved, although to others this was not perceptible. *Fifteen minims of Mur. Morph. ordered. Dec. 18th.*—His wife states that he slept from three to six o'clock this morning. The dyspnœa is as great as before the venesection, respirations catching in character. Has passed very little urine, and that at stool; on examination it was found to contain pus corpuscles in considerable quantity, beside the casts before mentioned. He is obliged to sit up and lean forward in bed; his intellects are somewhat impaired. During the night delirious. *Dec. 20th.*–Evidently sinking, but conscious. *Dec. 21st.*—Died this morning at half-past three o'clock.

Sectio Cadaveris.—Thirty-three hours after death.

The body is generally anasarcous, with great œdema of the scrotum; surface pale; no trace of scabies, with the exception of a few small circular cicatrices about the hands and fingers.

Thorax.—All the cavities of the heart and large vessels were distended with blood, for the most part coagulated and decolorized. The cavities of the heart itself in consequence were dilated. This was especially observed of the left ventricle, the walls of which were rather thinner than natural. The pericardium and all the valves were healthy. The heart weighed 16 oz. The right pleura was everywhere strongly adherent. The right lung was moderately voluminous, and felt heavy. On section, it was seen to be highly œdematous, yielding on pressure a copious frothy fluid. No solid exudation anywhere. The left lung was unadherent, and rather less voluminous than the right one, and though œdematous was not so in the same degree.

Abdomen.—On stripping off the capsule from the surface of the kidneys, they both appeared of their normal size and of a pale fawn colour. When cut into, the cones were found somewhat congested, the cortical tissue pale. The latter contained numerous white lines or streaks, generally directed at right angles to the circumference of the organ. There was no trace of granulation, and the density of the kidneys was much diminished, the organs being more soft than usual; sp. gr. of cortical substance 1047. The liver was congested, but otherwise normal; it weighed 4 lbs.; sp. gr. 1056. The other abdominal viscera were healthy.

Microscopic Examination.—On scraping a fresh cut surface of the kidney, a pulpy matter was readily obtained, which, on examination under a power of 250 diameters, was seen to be composed of large fragments of the tubes, crowded with epithelial cells, which were agglutinated together by a fine molecular matter. Groups of these cells surrounded by, or imbedded in this molecular substance could also be seen isolated. On the addition of acetic acid, the molecular matter and the walls of the cells were rendered more transparent, whilst the nuclei were unaffected. The urine in the bladder contained a few desquamative casts of the tubes, spermatozoa, and a number of isolated epithelial cells from the kidney.

Commentary.—The acute disease of which this man died, came on in the ward during the inunctions he practised over the body in order to remove a chronic scabies, which extended itself to a great extent over the integument. The first approach was so slow as not to excite attention—he himself considering it as an ordinary cold. On the 10th of December, when cough and some dyspnœa excited my attention, the feet and legs were already œdematous, and the urine diminished in quantity, as well as highly albuminous. It was observable, however, that there were no symptoms of fever, no local pain, and the question arose, whether in conjunction with diminished urinary excretion, there was or was not pneumonia. My diagnosis in the negative was assisted not only by the absence of febrile symptoms, and by the loud and superficial character of the crepitating rale in both lungs spreading upwards, but by the constant presence of chlorides in the urine (see p. 367). On the other hand, the chemical and microscopical examination of the urine soon left us in no doubt that we had to do with an acute attack of desquamative nephritis, producing general anasarca, and more especially rapid œdema of the lungs. This diagnosis was fully confirmed by the dissection after death, the cortical portion of the kidneys being pale and comparatively free from blood, whilst the tubes were gorged with exudative granular matter, mingled with a mass of epithelial cells. Both lungs, especially the right one, were infiltrated with serum. The rapid progress of this case, evidently dependent on obstruction of the renal tubes, seemed to demand active remedies. But the state of the pulse and tendency to prostration from the commencement forbade antiphlogistic remedies, even had other considerations not pointed out their inutility (see p. 266). For the same reasons, diaphoretics were too slow and uncertain in their action to be depended on, although morphia and local warmth were tried. Diuretics, therefore, were given, and subsequently stimulants to counteract exhaustion, a practice which, though condemned by some on the principle that we stimulate an organ already in a state of irritation, we have too frequently seen succeed when all other remedies had failed, to have any doubt as to its value. The real danger, however, in this case was early to be traced to the consecutive effect on the lungs, and the difficulty the heart experienced in propelling the blood through those organs, so that at length as a palliative I determined on venesection. The man's arm was so œdematous, and the vein so small, that I was obliged to perform the operation myself, and it is remarkable, as illustrative of the infrequency of phlebotomy now-a-days, that of three advanced students present only one had ever seen an individual bled, and that the nurse who held the basin fainted away. At this time the man's pulse was imperceptible at the wrist, although the heart's action was strong. He stated that he felt somewhat better, but I regretted to observe that little or no relief was afforded to him.

Case CLV.*—*Acute Desquamative and Hæmorrhagic Nephritis—Hydrothorax—Collapse of the Right Lung—Pulmonary Œdema and Bronchitis, with symptoms of Pneumonia.*

History.—Andrew Craig, æt. 45, a waiter, stout and fat—admitted July 1st, 1851. He has had delirium tremens several times, and been of very dissipated habits. Six days ago, after unusual exertion, during which he was exposed to wet, he was seized with rigors, fever, and vomiting. Next day he observed his feet to be œdematous, and his urine to be highly coloured; cough and expectoration subsequently made their appearance, and yesterday the breathing became very difficult, symptoms which continued to increase.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Symptoms on Admission.—On admission the body generally is anasarcous, and the face puffy and bloated. He labours under great dyspnœa, has a troublesome cough accompanied by a viscid sputum, in some places of a rusty colour, and in others mingled with clots of blood the size of a pea. On percussion there is marked comparative dulness at the base of right lung anteriorly, extending two inches above the hepatic dulness. Inspiratory murmur over this dull portion is accompanied by harsh and tubular breathing, with increase of the vocal resonance. Posteriorly, also, marked dulness on right side, over lower half of lung, with loud crepitation on inspiration, and bronchophony. The heart sounds are quick, healthy in character, impulse strong. Pulse 100, feeble. The urine is of a dark brown colour, turbid, and much diminished in quantity; sp. gr. 1014; highly coagulable on the addition of heat and nitric acid, and exhibiting under the microscope numerous desquamative casts, mingled with blood corpuscles. Other functions normal. ℞ *Vin. Antim.* ʒij; *Sp. Æther. Nit.* ʒij; *Aquæ* ℥vss. M. *A table-spoonful to be taken every four hours. To have* ℥iij *of Wine daily.*

Progress of the Case.—*July 2d.*—The dulness and crepitation posteriorly is now as high as the middle of scapula on the right side, and there is commencing dulness, with crepitation audible low down, posteriorly over left lung. Dyspnœa increased. Other symptoms the same. To be cupped over chest, and ℥v of blood extracted. *Hab. Pulv. Jalap.* comp. ʒj. *July 3d.*—Dulness now extends over two thirds of both lungs posteriorly and inferiorly, with loud bubbling rattles on inspiration and bronchophony. Anasarca has greatly increased, the lower extremities and the scrotum being enlarged and distended. Only 8 oz. of urine passed since yesterday, of dirty brown colour, and turbid; otherwise the same. Bowels well open. Dyspnœa now urgent. Cough frequent and troublesome. Sputum pneumonic. Pulse 120, weak. *To have Pot. Bitart.* ʒss *three times a-day, and* ℥iij *of Gin instead of the Wine; nutrients. July 4th.*—Has passed 16 oz. of urine, and is somewhat better. Prostration continues great. Otherwise the same. *July 5th.*—Comatose, and evidently sinking. He expired on the morning of the 6*th.*

Sectio Cadaveris.—Fifty hours after death.

Anasarca of the whole body.

Head.—The subarachnoid cavity contained a considerable quantity of fluid. elevating the surface above the convolutions. The lateral ventricles contained little serum. Otherwise normal.

Thorax.—Each pleural cavity contained about a pint of sero-sanguinolent fluid. Both lungs condensed from collapse posteriorly, but crepitant anteriorly. On section they presented a smooth surface of purple colour, and yielded on pressure a copious frothy fluid. The large bronchi were filled with muco-purulent matter, and their lining membrane was stained of a dark mahogany colour, and highly congested. Heart weighed 19 oz. Hypertrophy, with dilatation of right ventricle. Valves healthy.

Abdomen.—Kidneys of large size, the two weighing 18 oz. They were externally of a brownish purple colour, the vessels everywhere congested, with hæmorrhagic spots, the size of pins' heads, scattered numerously over their surface. On section, the cortical substance was mottled; the dark congested patches being mingled with white, opaque, and fawn-coloured substance. The malpighian bodies here and there were tinged with blood. The tubular cones were of a deep purple colour, especially towards their base. The mucous membrane of the pelvis moderately congested. Liver congested and somewhat enlarged. Other organs normal.

Microscopic Examination.—The fawn-coloured portion of the cortical substance of the kidneys was soft, and the tubes crowded with desquamated epithelial cells mingled with molecular exudation. The vessels in the congested parts were tinged with blood. The hæmorrhagic spots depended on the extravasation of blood into one or more convolutions of the tubes.

Commentary.—This case was in many respects like the last, but its progress was even more rapid. The pulmonary oppression and œdema came on more quickly, and having been at first confined to the right side, accompanied with tenacious sputum of a rusty colour, and ushered in by rigors and febrile symptoms, presented all the symptoms and physical signs of a pneumonia. Thus the febrile attack corresponded with the commencing period of the supposed pneumonia. Then the man was a waiter, and an habitual tippler, and we were called upon to decide whether the acute symptoms were connected with the lung or with the kidney. Now it is rare to see a case of acute nephritis producing general anasarca, and running its course so rapidly, and in consequence we considered the renal disease to have been chronic—in short, an ordinary case of Bright's disease, with supervening pneumonia. It turned out, however, to be an acute attack of nephritis, accompanied by rigors, fever, vomiting, etc., followed by rapid anasarca, and death by coma. The rusty sputum was also calculated to mislead ; for although the air tubes were filled with tenacious purulent mucus, there was no appearance after death of bloody extravasation into the parenchyma of the lung. It must, therefore, have been altogether bronchitic. Such a case of acute nephritis, so complicated, must be considered of extreme rarity. It occurred before the value of testing the urine for chlorides was known, as a diagnostic sign of pneumonia, or I might have been assisted in attributing the acute symptoms to the kidneys rather than to the lungs. On dissection there was found the same desquamative nephritis as in the last case, associated with hemorrhage into the tubes and malpighian bodies, and intense congestion of the capillaries, especially on the surface. This, of course, added to the obstructive character of the lesion, and increased the fatality of the case. I cannot help thinking that many such cases as the two just recorded must have been mistaken by physicians for pneumonia, before the advantages of auscultation were known. If complicated with aortic disease, there would have been a hard vibrating pulse, and large bleedings, and antiphlogistic remedies used, which would have hastened the fatal result. Modern medicine, by pointing out that such cases depend on obstruction of the uriniferous tubes by desquamated epithelium or extravasated blood, surely demonstrates that blood-letting can have little to do with their relief. Even as a palliative it often fails, as Case CLIV. sufficiently shows.

The hemorrhage into the tubes and great vascular congestion in this case occasioned greater obstruction to the renal excretion than occurred in the former one. Hence the uræmia and head symptoms which existed for twenty-four hours before death, a symptom from which Lawson was comparatively free.

CASE CLVI.*—*Acute Nephritis—Chronic Pneumonia—Œdema of the Lung and Anasarca proving fatal—Perforating Ulcer of the Duodenum, without symptoms.*

HISTORY.—James Abernethy, æt. 41, a cooper—admitted July 21, 1855. States that he has always enjoyed good health until swelling and suppuration occurred in his left hand, for which he entered the surgical hospital last April. Six weeks ago he observed his urine become as dark as porter, and his feet and legs to be swollen. These symptoms were preceded by rigors, but no pain in the loins or anywhere else. The œdema continued to extend, and three weeks ago dyspnœa came on, which has gradually increased until now. He has had no cough or expectoration.

SYMPTOMS ON ADMISSION.—The urine is of a muddy brown colour, deficient in quantity, no pain or difficulty in voiding it. It contains a considerable amount of albumen, with the normal amount of chlorides; sp. gr. 1020. With the microscope there can be seen numerous waxy casts of various sizes, some stretching completely across the field, and branched, others convoluted. Many are filled with epithelium, several only half filled, and not a few are composed of a pale, diaphanous membrane. There are also present a few pus and blood corpuscles, and a good many granules and granule cells, with an abundance of phosphates. On percussing the chest the resonance is equal and good on both sides anteriorly. On the mouth being opened, a loud cracked-pot sound can be elicited over the whole anterior surface of right lung. Posteriorly there is dulness over the inferior half of this lung, with pealing resonance of the voice, and crepitation on inspiration. There is also slight crepitation, with sibilation over the lower half of the left lung posteriorly, but no dulness or increase of vocal resonance. Heart sounds are normal; pulse 94, regular but weak. No appetite, great thirst; abdomen somewhat distended and fluctuating. Skin generally anasarcous; that over the back pitting deeply on pressure. The left arm, from the elbow down, is one mass of ulceration, with purulent infiltration among the cellular tissue. He is very weak and exhausted. ℞ *Spt. Æth. Nit.* ʒij; *Spt. Æth. Chlori.* ʒiss; *Sol. Mur. Morph.* ʒj; *Aquæ ad* ℥viij; *ft. Mist. One ounce to be taken every night, or when the breathing is urgent. Habeat Potas. Bitart.* ℈j *ter indies.*

PROGRESS OF THE CASE.—*July 25th.*—There has been little change until to-day, when he has become somnolent. Cannot take nutrients. Pulse continues very weak. Dry cupping, diaphoretics, and diuretics have failed to increase the amount of urine. Continue nutrients and wine at intervals. *July 26th.*—Loud crepitations now heard over both backs. Dyspnœa urgent. Surface covered with sweat, but no alleviation in the symptoms. Died on the 27*th.*

Sectio Cadaveris.—Twenty hours after death.

Body generally anasarcous; left forearm the seat of erysipelatous ulceration.

THORAX.—Both lungs œdematous, with coherent pleuræ. On separating these on the right side posteriorly, the pulmonary texture broke up, being rendered soft by chronic pneumonia, everywhere infiltrated with serum. At the apex of right lung, a few cretaceous masses.

ABDOMEN.—On the under surface of the right lobe of the liver, below the peritoneal coat, were several calcareous concretions the size of millet seeds, adherent in two places to the coats of veins, and projecting slightly into their canal (phlebolites). The gall-bladder was slightly thickened; the cystic duct obstructed in its centre; but the hepatic duct pervious. Both kidneys were of a pale yellow colour externally, slightly mottled with vascular patches. On section the cortical substance was slightly diminished in thickness, and the cones unusually congested. An inch beyond the pylorus, the duodenum was perforated by a round ulcer, the size of a fourpenny-piece, the edges of which were adherent by soft lymph to the pancreas and a neighbouring coil of intestine. Internally the edge of the ulcer was black, and around it were several patches varying in size from a threepenny-piece to that of a shilling, quite black. The peritoneum contained about half a gallon of serum. Other organs normal.

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* Reported by Mr. Robert Byers, Clinical Clerk.

Microscopic Examination.—The cortical substance of the kidneys showed the convoluted tubes to be filled with desquamated epithelium, a considerable proportion of which had undergone the fatty degeneration.

Commentary.—Following on a prolonged ulceration in the arm, which had confined this patient to the surgical hospital, there supervened desquamative nephritis, general anasarca, and œdema of the lungs, similar to what occurred in the two preceding cases. There was also present universal adhesion of both pleuræ, and disorganization of the posterior and inferior half of the right lung, as I conceive, from a limited exudation into its texture. What, however, constitutes a remarkable feature in this case, is the presence of a chronic ulcer in the duodenum, which had not been manifested by any symptom whatever; which was attended by limited hemorrhage into the mucous coat of the intestine internally, and externally by exudation, or so-called effusion of lymph (peritonitis), without any local pain or uneasiness.

The term Desquamative Nephritis was introduced by Dr. Johnson, to denominate a lesion in which the tubes of the kidney are blocked up, not only by exudation, but by the separation and accumulation of their epithelial cells. Such desquamation, I believe, occurs occasionally in all epithelial and epidemic structures. I have occasionally seen it in the lung, forming what may be called a desquamative or vesicular pneumonia. If it occurs generally throughout both kidneys, as in the three last cases narrated, it is usually fatal; but if partial, and a sufficient number of tubes are left unobstructed, so as to admit of increased action under the stimulus of diuretics, a cure may be anticipated. Under such circumstances, also, a spontaneous recovery may be hoped for, which may be assisted by diaphoretics. So far from considering diuretics injurious, I believe that in such cases they hold out the only chance of successful treatment. Cupping and diaphoretics in such violent and rapid cases are wholly insufficient to overcome the tubular obstruction, however they may occasionally relieve. On the other hand, the good effects of diuretics were well observed in Case CLII. and CLIII.

CASE CLVII.*—*Nephritis followed by the formation of a large Abscess in the Right Kidney, opening into the lumbar cellular tissue—Ulceration of Ureter and Bladder—Thickening of Mitral and Tricuspid Valves—Partial Atrophy of Lungs, with and without Induration—Partial Œdema.*

HISTORY.—Margaret Martin, æt. 47, servant—admitted 18th October 1852. She always enjoyed good health till about twelve months ago, when she was exposed to cold, and got her feet wet. Shortly after, she was attacked with dysuria, and observed that the urine was of a very dark red colour, and much diminished in quantity. A week afterwards, she experienced sharp cutting pains in the hypogastrium, stretching down the thighs. She was still able, however, to follow her usual occupation, till the beginning of September last, when she suffered from pain in region of right kidney, in the larger joints, and from œdema of the legs, especially the right. The bowels have been very costive, and the abdomen has become much distended. Four weeks ago she passed some very dark, bloody-looking matter in the urine, which continued of a red colour for five days. Her habits appear to have been rather intemperate.

SYMPTOMS ON ADMISSION.—On admission, the tongue is loaded in the centre with a dark fur, great thirst, but good appetite; bowels open. There is distinct fulness and dulness on percussion in the right lumbar region, extending as far forward as the umbilicus, and filling up the space between the false ribs and crest of the ilium; and there is great tenderness on pressure over the same extent. Has some pain in micturition, shooting down the thighs, especially on right side, which is also somewhat œdematous. Urine passed in very small quantity, sp. gr. 1015. It is albuminous, and deposits on standing a copious sediment, showing under the microscope numerous pus and blood corpuscles. Pulse 90, of good strength, but occasionally intermitting. She has occasional palpitation. The cardiac dulness is somewhat increased transversely; impulse very strong, and an indistinct hollow murmur accompanies the first sound, and is heard loudest at the apex. The thorax is considerably deformed, and the sternum highly arched; but the chest is otherwise normal. *Habt. Enema c. Ol. Terebinth,* ℥i.

PROGRESS OF THE CASE.—*Nov.* 20.—The bowels not having been fully acted on by the enema, she was ordered last night, *half a drachm of Compound powder of Jalap,* which caused copious stools. ℞ *Infus. Papav.* ℥v; *Tinct. Hyoscyam.* ʒij; *Syrupi* ℥i. M. *Sumat* ℥j *ter indies.* *Nov.* 21.—Has been complaining much of pain in loins and right leg. She was ordered *an enema, with half a drachm of the Sol. of Morphia* on the evening of the 20th; and last night, the pain having again returned, and prevented her from sleeping, she had the following draught: ℞ *Sol. M. Morph.* ʒss; *Tinct. Hyoscyam.* ℥j; *Mucilaginis et Aq. Menth.* āā ℥ss. M. *Nov.* 22.—Feels much better to-day. There is less swelling of abdomen, little or no pain in hypogastrium, but a feeling of soreness in right lumbar region. Bowels confined; urine passed in small quantity, albuminous, and contains a large deposit, consisting chiefly of pus. *Nov.* 24.—Continues in the same state, but complains much of pain in bowels, which are still confined. Urine passed in small quantity. She was ordered yesterday the following:—℞ *Bitart. Potass.* ʒii; *Gambogiæ,* gr. ij. M. *ft. pulv. hora somni sumend. et habeat mane Pulv. Doveri* gr. xv. The bowels were freely opened, with considerable relief to painful distension of abdomen, but no diminution of the swelling and hardness. *Appl. Tinct. Iodinei abdomini.*

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* Reported by Mr. Francis M. Russell, Clinical Clerk.

Nov. 28.—Is complaining much of pain in abdomen and right leg, for which *she had* 10 *grains of Dover's powder last night*, with partial relief. The cough is now troubling her more, and she seems much weaker. ℞ *Æth. Chlor.* ʒij ; *Sol. Mur. Morph.* ʒj ; *Sp. Ammon. Aromat.* ʒiij ; *Mist. Camph.* ℥vss. M. *Sumat* ℥ss *ter indies.* *Nov.* 30.—On auscultation of chest, occasional moist rales are to be heard, with prolonged expiration ; but no increase of vocal resonance. The sounds of the heart are heard very distinct over the whole chest. The apex beats in epigastrium ; its action is irregular, and a blowing murmur accompanies the first sound. There is still tenderness in right lumbar region, with great pain in right iliac ; the swelling of abdomen has not diminished, and upon deep pressure, a distinct fulness and hardness can be felt in right iliac fossa, *to which four leeches were ordered to be applied, followed by warm fomentations.* ℞ *Sp. Æther. Nit.* ℥ss ; *Liquor. Potass.* ʒij ; *Mucilag.* ℥ij ; *Sol. M. Morph.* ʒiij ; *Aquæ* ℥iij. M. *Sumat* ℥ss *quaque hora. Intermit. alia medicamenta. Habeat Sp. Juniperi Co.* ℥iii *per diem.* *December* 3. —Feels rather better, but bowels very costive, unaffected by a powder of calomel and jalap administered last night. The urine is still albuminous ; sp. gr. 1015. Quantity not ascertained. There is now slight but painful œdema of right arm, *Hab. Enema Catharticum.* *Dec.* 6.—Bowels well open. She now feels much relieved of the pain in abdomen ; the tumour in right lumbar, umbilical, and iliac regions, remains unaffected. The œdema of leg has now disappeared ; but the pain and swelling of arm have gradually increased, and extended as far as the shoulder. The whole arm is exquisitely tender. No circumscribed tumours can be anywhere detected in the arm or axilla. For the last three days, the quantity of urine has varied from 12 to 20 oz. in the 24 hours. There is still a very copious mucus-like sediment when examined by the microscope ; no blood globules can now be detected ; but there are still numerous disintegrated pus corpuscles, with crystals of triple phosphates and amorphous urate of ammonia. The albumen has not disappeared. *Lotion of Acetate of Lead and Opium to be applied to the arm, with warm fomentations.* *Dec.* 8.—Complains of great pain in arm, which is very much swollen, and generally hard, but pits slightly on pressure, and is of a white colour at the upper part ; but at the wrist it is much darker, and on the back of the hand two large phlyctenæ have formed during the night, and other portions of the surrounding surface vary in colour, from a slight red to a yellow and brownish green. There is some œdema of leg, but of slight extent ; and, for a few days back, some dark purple spots, permanent on pressure, have appeared on the inside of right thigh and knee. She complains much of loss of sensibility in the arm, and of cold feet, but their temperature appears natural to the touch. She is very weak, and takes no food, The pulse 120, feeble and fluttering. Urine sp. gr. 1015. Not affected by heat or nitric acid. It is now passed involuntarily in bed. ℞ *Spt. Ammon. Ar.; Æth. Chlor.* āā. ʒij ; *Tinct. Card. co.* ʒii ; *Mist. Camph.* ℥vii. M. *Sumat* ʒj *singulis horis. To have* 4 *oz. of Brandy.* *Dec.* 9.—Died this morning about ten o'clock.

Sectio Cadaveris.—Twenty-six hours after death.

Anasarca, especially of right arm and leg, but nowhere extreme. A large tumour, elastic, not fluctuating, moderately tense, occupied the abdomen on the right side from the liver to the ilium, and from the loins to the umbilicus, projecting in either direction. Percussion over it generally dull. It can be limited from the liver, which is not large.

THORAX.—Pericardium contains about an ounce of serum, and on the surface of the heart are numerous opaque fibrous patches. *Heart*—rather small. The free edges of the tricuspid and mitral valves were thickened and rounded, but with no distinct appearance of deposit on their surface. In the substance of the septal segment of mitral valve, near its roots, there were a few calcareous masses. Weight of heart, 9¼ oz. *Lungs.*—Right pleura, normal; lung throughout free from adhesions; some serous engorgement, with considerable collapse posteriorly; anteriorly, no marked emphysema. *Left Lung* presents firm adhesions over upper lobe, which is much diminished in volume, and has a dense, scarcely crepitating, tissue.

Abdomen.—On opening the abdomen, the tumour was found to be situated behind the ascending colon. The right lobe of the liver overlapped it in front to the extent of several inches, and was adherent to it by firm and close fibrous bands. The peritoneum was stretched over the tumour so as to obliterate the mesocolic folds in front, and keep the ascending colon closely in contact with it. It proved to be an abscess, containing about a quart of fluid, which was sero-purulent (with large proportion of pus), of a yellow colour, with a faint greenish tinge, and a good deal of fœtor. The main sac of this abscess was situated in the lumbar cellular tissue of the right side, and had in front of it the right kidney, the interior of which communicated by several ulcerated openings with the cavity of the abscess. The posterior wall of the abscess rested on the lumbar muscles, and on the right side of the vertebræ, the periosteum of which was entire. The superior wall was very closely adherent to the liver, which, at its anterior part, had a depression or excavation about half an inch in depth, and two or three inches in diameter. The left lobe of the liver was displaced upwards, and the right lobe was elongated downwards, being closely adherent to the right and upper aspect of the swelling. The stomach and neighbouring viscera were displaced by the tumour, but were healthy. *Left kidney* normal. *Right kidney* much disorganized; its size not altered; on section, numerous abscesses containing pus like that within the tumour, occupying both the cortical and tubular part; the walls of the abscess composed of flocculent and curdy greyish-yellow matter, presenting, under the microscope, the debris of cell forms, with very numerous granules. The pelvis of the kidney could scarcely be identified, being converted into a receptacle for pus. The intervening tissue between the abscesses was condensed and indurated, and at some points enclosed a quantity of matter similar to that constituting the walls of the abscesses. Several angular calculi, the size of mustard seeds, were impacted in one of the infundibula, the mucous membrane of which was smooth and free from ulceration. On examination, they proved to be composed chiefly of phosphatic earthy salts and animal matter. The *ureter* was thickened throughout, not dilated; the mucous membrane totally disorganized, rough, and resembling the walls of the renal abscesses. The *bladder* had also fully one half of the mucous membrane removed in irregular patches by ulceration; the remaining parts were much congested, but smooth. No deposit of calcareous matter in any quantity. The ulceration of the vesical mucous membrane extended to the neck of the bladder, and ended abruptly at the commencement of the urethra, which, with the exception of some congestion of the mucous membrane, was normal. The *uterus* contained a polypus, the size of a bean, composed principally of the mucous membrane, and attached to the posterior wall. Os uteri slightly tinged, of a purplish colour. *Ovaries*, *vagina*, and external parts normal. Other organs normal.

Commentary.—The occurrence of abscess in the kidney is often a very insidious disease, existing frequently for many months, and giving rise to obscure pain in the back, occasional rigor, feverishness, and high-coloured or muddy urine, which, when examined microscopically, may be seen to contain blood and pus corpuscles. If the disorganizing process continue, and an opening form externally, inflammation, followed by suppuration of the cellular tissue behind the peritoneum, occurs, causing fever of a low type, and œdema more or less general. Such an occurrence usually proves fatal. In the present case, death was delayed apparently from the abscess having been, to a certain extent, circumscribed, and forming a large cyst, so as to present the form of a tumour, the nature of which, during life, it was very difficult to determine, although the renal disease was clearly apparent.

CASE CLVIII.*—*Scrofulous Nephritis and Abscesses in the Kidneys—Extensive deposition of Tubercle in the Lungs and Intestines.*

HISTORY.—George Paton, æt. 20, sailor—admitted 19th July 1854. States that he enjoyed good health until seven years ago, when he noticed his urine tinged with blood, after having undergone considerable exercise in sliding on ice. The hæmaturia gave him no uneasiness until three weeks afterwards, when he began to suffer pain in the epigastrium, and a deep seated burning pain in the pelvis. He could get little rest in consequence, and his micturition became frequent, almost every hour. He continued to suffer more or less in this way for two years, the pain and hæmaturia abating, and again recurring at intervals of a few weeks. He then went to sea, and remained tolerably free of the disease for three years. His ailment then returned again in aggravated form, after exposure to a storm. He obtained admission on board the Dreadnought hospital ship at this time, and had his bladder repeatedly examined for stone, but no calculus could be detected. After being a few weeks in the Dreadnought, he left it and went to sea again, though in very imperfect health. About twelve months ago, whilst lying in the Downs, he had a very severe attack of deep-seated pelvic pain and hæmaturia. He now, for the first time, complained of pain in the back, which has never left him since, and the character of the urine underwent a change. It became white and turbid, and on standing, emitted a putrid odour. He recovered partially from this attack, and went shortly afterwards on a voyage up the Danube, where his disease became aggravated from the exposure he was subjected to. Since that time his general health has been declining more rapidly than formerly.

SYMPTOMS ON ADMISSION.—On admission, he is considerably emaciated, countenance pale, and his expression anxious ; skin dry ; urine white and turbid, sp. gr. 1010 ; on standing, a large sediment falls down, which under the microscope is found to consist of pus, and under heat and nitric acid a large coagulum forms. He complains of pain in the hypogastrium and right lumbar region, of a dragging character ; he has also pain in the point of the penis during and after micturition ; tongue moist and florid ; he complains of sore throat, and on examination, the tonsils are seen to be enlarged and covered with pus. He has tenderness of the epigastrium, and is troubled with vomiting immediately after taking food. Bowels regular. On percussing the chest, dulness can be detected at the apex of the right lung, anteriorly and posteriorly ; on auscultation there is slight sibilation under the right clavicle, with slight increase of the vocal resonance. He has a slight cough, but no expectoration ; pulse 88, and of good strength. Cardiac sounds feeble ; heard loudest over the sternum, and a little to its right side ; otherwise they are healthy. ℞ *Infus. Lini* lbj. *To be taken ad libitum. Throat to be sponged with a solution of nitrate of silver. Good diet.*

PROGRESS OF THE CASE.—*July 25th.*—The sponge has been three times applied to the throat, and it is nearly well. The pain has left the hypogastric region, and he has now a feeling of weakness in the right lumbar region. Urine of a milky colour, contains less albumen, sp. gr. 1007. ℞ *Tinct. Iodinei* ʒi. *To be painted over the lumbar region.* ℞ *Decoct. Uvæ Ursi* lbj. *One ounce to be taken four times a day. August 8th.*—During last week he has been suffering from nausea, vomiting, and looseness of bowels. *Aug. 12th.*—These few days past he has had rigors, followed by heat of skin and sweating. The attacks last only for a couple of hours, and come on regularly at two o'clock. He has been ordered the following pills:—℞ *Sulph. Quinæ* ʒss; *Conf. Rosar. quant. suff. ft. massa. in pilul.* xx. *dividenda. Two to be taken every sixth hour during the intermissions.* Diarrhœa has continued, and for it he has been using the following mixture:—℞ *Tinct. Catechu* ʒvi; *Sol. Mur. Morph.* ʒij; *Conf. Aromat.* ʒi; *Mist. Cretæ* ℥v. M. *One table-spoonful to be taken three times a day. Aug. 14th.*—Diarrhœa relieved; urine less turbid; sp. gr. 1009; not coagulable by heat and nitric acid. *Aug. 21st.*—Since last report has been gradually growing weaker. Mucous rale has been occasionally audible under the right clavicle; expectoration insignificant. He has been unable to retain any food on his stomach for several days, scarcely even wine and water. Diarrhœa has also returned. Latterly his strength has become very much exhausted, and during the last two days, he has lain in a state of great prostration; his pulse often scarcely to be felt at the wrist; his intellect, however, never became impaired. This morning he died at four o'clock.

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* Reported by Mr. Almeric W. Seymour, Clinical Clerk.

Sectio Cadaveris.—Fifty-eight hours after death.

Body much emaciated; rigor mortis considerable.

THORAX.—*Pericardium* normal; contained about three drachms of clear straw-coloured serum. *Heart* small and soft; valves healthy; muscular substance pale; under the microscope, the muscular fibres appear deficient in striæ, and loaded with small fatty granules. *Left pleura* normal. *Right pleura* presents dense adhesions over the whole of the lung, more marked, however, at the apex and base. *The right lung* itself was small, collapsed, and excessively emphysematous along its anterior free margin. The apex presented numerous hard cicatrices, and on being cut into, shewed numerous tubercular masses in all stages, some of them commencing to break down and disintegrate, others undergoing the process of hardening and repair. In one spot, about an inch below the apex, a small vomica, about the size of a hazel nut, existed. *Left lung* voluminous; highly emphysematous; cicatrized around the apex, the cicatrices, as in the other lung, being very firm and dense. On being cut into, masses of tubercular matter were found, but in a more latent state than in right lung.

ABDOMEN.—Liver normal in size, undergoing the fatty degeneration; pale-coloured and friable; under the microscope, the hepatic cells appeared loaded with fat. Spleen normal. Small intestines healthy, slightly congested towards the lower part. *Large intestines.* The mucous membrane, throughout the whole extent, but particularly in the descending colon, sigmoid flexure and rectum appeared thickened, congested, and in many places ulcerated; the ulcers were small, their edges very slightly elevated, and their surface undergoing the process of separation. *Right kidney* was much enlarged; quite smooth; the capsule densely adherent. On dividing the ureter, pus escaped in considerable quantity from the pelvis of the kidney; and on cutting into the substance of the gland itself, several ulcers, varying in size from a horse-bean to that of a small walnut, were found; their contents varied in consistence; in some, the pus was thin and diffluent; in others, it had the consistence and appearance of white paint. The ureter on this side was greatly thickened, of the size of an ordinary little finger; the thickening extended beyond the orifice of the ureter along the trigone of the bladder; the ureter was quite pervious, and contained a quantity of pus. *Left kidney* was small and lobulated; the substance of the gland was found to have disappeared, leaving a large cavity, which was enclosed by a covering of the proper substance of the kidney, not exceeding four lines in thickness, and filled with cheesy matter of the consistence of putty; the ureter was closed, except for two inches above the bladder; externally, it was of normal size; muscular wall of *bladder* somewhat thickened, especially around the orifice of the right ureter; mucous coat congested and much softened; the bladder contained about 6 oz. of thick, turbid, semi-purulent matter.

Commentary.—In this case, the renal abscesses formed in a young man of scrofulous constitution, and exhibited a more lingering tendency than in the former one. Indeed, notwithstanding the great disorganization found in the kidneys after death, the fatal result was chiefly brought about by the intestinal disease, and the exhaustion caused by colliquative diarrhœa. The left kidney evidently presented the incipient changes which commonly precede the spontaneous cure of scrofulous abscesses in this, as in other internal organs. The purulent matter was the consistence of putty, the animal portion having for the most part been broken down and absorbed, while the mineral portion was comparatively increased. In this manner, not unfrequently encysted cretaceous masses form in the kidney and remain latent, the rest of the renal substance performing its normal function. Sometimes an entire kidney may, in this manner, be completely destroyed, and the whole converted into a calcareous mass, of which I possess a remarkable example, from an individual who had quite recovered from the disease, and whose remaining kidney, though enlarged, was in its texture healthy. Indeed, the spontaneous cure of tubercular depositions in the kidney, presents the same pathological history as that we have described of similar lesions occurring in the lungs, p. 671, and the puckerings, cicatrices, cretaceous and calcareous concretions resulting from them, have a similar significance. It follows that our general principles of treatment should also be the same, namely, supporting the constitution by analeptics and especially by cod-liver oil, so as to enable nature to bring about a cure. This should always be the primary object of treatment; whilst remedies directed to the renal symptoms should, although by no means neglected, be subordinate to that great end. In the present case this indication could not be fulfilled on account of the great irritability of the alimentary canal, especially of the stomach. For another example of this disease, see Case CXL.

CASE CLIX.*—*Calculous Nephritis and Gangrenous Abscess of Right Kidney—Waxy Liver—Recto-Vesical Fistula.*

HISTORY.—James Allan, æt. 25, a tin and copper smith—admitted August 18, 1848. At three years of age was cut for stone by Mr. Liston. Since then he enjoyed good health until three years ago, when, after straining himself at a trial of strength, he was suddenly seized with a sharp pain in the right flank, just below the ribs. At the same time the urine became turbid, and was of a high colour.

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* Reported by Mr. Frederick Hunter, Clinical Clerk.

The pain left him at the end of three months, but the turbidity of the urine continued. After six months' interval he had a similar attack—this time, he says, induced by drinking a glass of spirits—which also lasted three months. After another interval of about six months, the pain and urinary symptoms again returned, and has continued more or less severe ever since. He was in the surgical hospital for three months, where he was frequently examined for stone, but none was found. At this time he was observed on several occasions to pass air by the urethra, the urine being of a gangrenous odour. He left the surgical hospital last May, and has been somewhat better since, the urine for some time having been clear and healthy. But having bathed in the sea a fortnight ago, he was seized with rigors, followed by fever, together with the former local symptoms, which have continued ever since.

Symptoms on Admission.—The countenance is pale and sallow, expression dejected; body not emaciated, but with a general look of chronic disease. He complains of great pain and tenderness in the right lumbar region, which on examination presents a fulness, without great deformity, but well marked when compared with the opposite side. The hepatic dulness on percussion measures five inches vertically, the lower margin anteriorly being on a line with the umbilicus, and stretching across the abdomen into the left hypochondrium. He has never suffered from pains shooting down to the bladder, nor in the bladder itself. But there is occasional pain after micturition, and always frequent desire to pass urine—indeed every hour—although little is voided. The urine is turbid, of dirty yellow colour; acid, of sp. gr. 1017, very fœtid, highly coagulable, and contains a considerable sediment of pus and mucus. The pulse is 108, soft. Tongue covered with a whitish fur. Appetite good. Other functions well performed. ℞ *Tart. Antim.* gr. ij; *Aquæ* ℥viij; *Solve. Capiat* ℥ss *tertiis horis. Applicent. Hirudines* viii. *lateri dolenti, et postea foveatur.*

Progress of the Case.—*September 26th.*—The local pain has been relieved by the treatment, but it returns with severity at intervals. For some time the urine has been clear. He has had a slight diarrhœa, which has been checked by a chalk and aromatic mixture; and has occasionally taken at night *Pulv. Doveri* gr. viij. *October 3d.*—Two days ago was again seized with rigors, fever, and acute pains in the right flank. The urine is again loaded with pus and mucus, and of fœtid odour. The appetite is gone; there is thirst and frequent vomiting. Pulse 120, soft. A *saline antimonial mixture. Oct. 6th.*—Anxious countenance; pain continues, preventing sleep. Can take no nourishment. Much exhausted. Vomiting diminished. ℞ *Pulv. Doveri* gr. x, *hora somni. Nutrients. Wine four ounces daily. Warm fomentations to the side. Oct. 10th.*—Local pain somewhat diminished. Complains of diarrhœa. ℞ *Acid Gallic.* ʒss; *Opii.* gr. xij; *Conf. Rosar. q. s.; ft. pil.* xij. *Sumat unam sexta quaque hora. Oct. 15th.*—Since last report has gradually sunk, and died this morning.

Sectio Cadaveris.—Forty-eight hours after death.

Thorax.—Pericardium contained about a drachm of turbid serum, with a few floating flakes of lymph. Lungs and heart healthy.

Abdomen.—The *liver* was considerably enlarged, and had undergone the waxy degeneration; its substance being pale and dense, with a smooth surface on section. On attempting to remove it, the right lobe was found to be adherent to the colon; and on separating this adhesion with the fingers, a quantity of pus escaped. This originated from a large abscess in the *right kidney*, containing about half a pint of pus, mixed with curdy matter. The superior wall was composed of the substance of the liver, a portion of the lower and posterior border of which organ was absorbed. The posterior wall rested on the quadratus lumborum muscle, and anteriorly it was in contact with the transverse colon and the pyloric end of the stomach. When opened from behind, the walls of the abscess were found to be covered with shreds of gangrenous tissue, of a dark greenish colour, of gangrenous odour. Renal substance could only be detected at the lower part; the rest of the kidney was converted into a fibro-cystic structure, in some places of great density. Two of the cysts contained uric acid calculi; one resembling in size and form two walnuts united together by a neck, the other of a somewhat angular form, with rounded edges, the size of a hazel nut. These calculi were embedded in pus, and partly projected into what might have been the pelvis of the kidney, but which was converted into a fibrous sac communicating with the ureter. The *bladder* presented at its neck the cicatrix of an incision made in the usual situation for lithotomy. About two inches above this were three mucous excrescences the size of peas. In the centre of these was a depressed spot, through which a director readily passed backwards and upwards through the cellular tissue into the rectum. The mucous surface of the rectum at this point was highly vascular, and covered with lymph in patches to the extent of four inches in depth round the gut. *Left kidney* weighed 13½ oz., and was healthy in structure. Other organs normal.

MICROSCOPIC EXAMINATION.—The structure of the left kidney was quite natural. The spleen presented the usual atrophied and translucent appearance in the cells, characteristic of the waxy degeneration, a few only containing a small number of fat granules.

Commentary.—The local and general symptoms in this case were so clear as to leave me in no doubt from the first, that this man had a calculus embedded in his right kidney, causing an abscess in that organ. The recurring rigors and fever, with pains shooting down the right groin to the bladder, and occasional vomiting; the turbid, bloody, purulent, and gangrenous urine; the remarkable fulness in the right lumbar region, with tenderness on pressure; and the past history of the case, constituted an unmistakeable group of phenomena diagnostic of calculous nephritis. Indeed, so certain was the fact, that more than once nephrotomy was spoken of as a possible means of relieving him, every other organ with the exception of the liver being at one time apparently healthy. It was with great interest, therefore, that the dissection after death was watched, which fully confirmed the diagnosis. It also pointed out that the other kidney was enlarged and healthy, performing double duty without difficulty; that the liver was enlarged and waxy, and that a recto-vesical fistula existed, causing disease of the intestinal mucous membrane to which the diarrhœa latterly might be attributed. In reference to an operation, it appeared to me at the time that it might easily have been effected after the method of Marchetti,* as the two calculi were loose within cysts, and surrounded by pus. The enlargement of the liver prevented the performance of such an operation being seriously entertained in this case. But here, as in ovariotomy, the great difficulty is to establish in the living subject an exact diagnosis, and this I had no difficulty in doing six weeks before his death, and when his general health was tolerably good. For such a disease nothing but palliatives are to be thought of. As the size of the stone cannot be known, diluents are indicated with the possibility of favouring its descent along the ureters to the bladder, a practice which, should it fail in that respect, is also useful in carrying off the pus which may accumulate in the pelvis of the kidney, should perchance any healthy secreting texture still remain in it.

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* An account of a gentleman being cut for the stone in the kidney, with a brief inquiry into the antiquity and practice of nephrotomy, by C. Bernard.—*Phil. Trans.* October 1696.

CASE CLX.*—*Chronic Pyelitis, and Cystic Kidneys—Dilatation of Ureters—Fungoid Ulceration of Urinary Bladder.*

HISTORY.—Jane Watson, æt. 74, widow—admitted November 15th, 1852. As far as can be ascertained from the patient, whose mental faculties are very much impaired, she has been labouring under her present complaint for the last eight months. About that time, she was exposed to cold from sleeping on damp straw, which was followed by rigors, pain in the back, and in the larger joints. The urine at the same time decreased considerably in quantity, with frequent micturition, accompanied by pain, symptoms which lasted for about a month, after which the amount of water passed became greatly increased in quantity, and dysuria disappeared. For the last three months, the urine had been occasionally mixed with blood, continuing for a few days, and then becoming natural. Since the date of her first attack, she has complained of pain in the region of the right kidney, much increased at those periods when blood was observed in the urine.

SYMPTOMS ON ADMISSION.—On admission, she has a peculiar cachectic appearance, and is much emaciated. Tongue moist, cracked in the centre, great thirst, appetite impaired, bowels costive. She has considerable pain and tenderness on pressure in the right lumbar region, where there is also some fulness. The urine is passed in considerable quantity, specific gravity 1010, alkaline, highly coagulable on the addition of heat and nitric acid. It is quite turbid when passed, and deposits on standing a copious yellowish gelatinous-like sediment, which, under the microscope, is seen to contain numerous pus corpuscles, granule cells, and casts of the tubes, crowded with granules. When the bladder is about half empty, there is frequently a sudden stoppage of the flow of urine, when she suffers from severe pain in the hypogastrium, stretching down the thighs especially on the right side. Pulse 90, of moderate strength. Heart's sounds feeble, otherwise normal. Other functions natural. The bladder was examined by Mr. Syme, and a large ulcer was detected, occupying the base and neck of the bladder. ℞ *Tinct. Hyoscyami* ʒvi; *Tinct. Opii* ʒij; *Mucilaginis et Aquæ* āā. ℥vi. M. *Sumat* ℥j *ter indies.*

PROGRESS OF THE CASE.—*November 18th.*—Continues much in the same state. Urine presents the same characters as before. *Omittatur mistura Hyoscyami.* ℞ *Potassæ Acetatis* ℥ss; *Sp. Ætheris Nitrici* ʒiij; *Mucilaginis et Aquæ* āā ℥iij. M. *Sumat* ℥j *quarta quaque hora.* ℞ *Solutionis Mur. Morphiæ* ʒj; *Mist. Camphoræ* ℥j. M. *Sumat dimidiam hora somni et repetatur post horas tres si opus sit. Warm fomentations to be applied to the loins. Nov. 21st.*—The warm fomentations were applied as ordered, and afforded considerable relief; she sleeps well at night after taking the draught; the casts have now disappeared from the urine, but a few granule cells are still visible, mixed with pus corpuscles, blood globules, and some crystals of triple phosphate. Specific gravity of urine still 1010, highly albuminous, and of a very putrid smell immediately after being passed. *Nov. 24th.*—The quantity of urine is now greatly diminished; presents the same characters as on the 21*st*. There is still pain and tenderness in right lumbar region; frequent desire to pass water, the first half of which flows with comparative facility, but the remainder comes away slowly, requiring external pressure to empty the bladder, at the same time there are sharp shooting pains in the vulva, and inside the thighs, extending down to the knees. She appears much exhausted; pulse weak, 96. *To have four ounces of Wine. Nov.* 28*th.*—Is much in the same state; the urine is still highly coagulable; the sediment examined by the microscope presents a large number, 1*st*, of finely molecular exudation casts; 2*dly*, groups of broken down pus cells; 3*dly*, crystals of triple phosphate; 4*thly*, granular cells; 5*thly*, blood corpuscles. *December* 4*th.*—Is now passing her fœces and urine involuntarily; appetite rather improved; pulse 85, weak. The warm fomentations have been continued since the 18th ult. *To have six ounces of wine. Dec.* 8*th.*—Still passes everything in bed; complains of great pain and tenderness in right lumbar region; still takes food well; pulse 90, of better strength. *Dec.* 15*th.*—Appetite very much impaired within the last two or three days; still complains of pain over right kidney, and passes dejections involuntarily. Only an ounce of urine could be obtained for examination. It is still coagulable; the sediment presenting, under the microscope, the same characters as on the 28th ult., with an increase in the number of blood corpuscles; pulse 100, very weak. *Dec.* 23*d.*—Since last report, the patient has been gradually sinking, and died this morning.

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* Reported by Mr. Robert Francis M. Russell, Clinical Clerk.

Sectio Cadaveris.—Fifty hours after death.

Body emaciated.

Thorax.—*Pericardium* contains about two ounces of serum. *Heart* small, presents a large amount of fat on its surface; valves and endocardium perfectly normal. *Left lung* slightly adherent at apex; middle and lower lobes of *right lung* strongly adherent posteriorly; both lungs were crepitant throughout with the exception of some hardened deposits at apex of the left, which look like old tubercle. Bronchi contain much frothy mucus. The *aorta* through the whole of its course (and both iliac arteries) contained a large amount of calcareous deposit, principally seated in the arch of the aorta, and the thoracic portion of that vessel.

Abdomen.—*Stomach and intestinal canal* normal; *pancreas* pale; *spleen* very small; *liver* small, congested, firm, and dense. *Lumbar glands* considerably enlarged, and contain a very great amount of yellowish opaque juice, evidently purulent, but no distinct abscesses. Both *kidneys* of normal size when viewed externally; the ureters dilated to the size of swan quills; pelvis of both kidneys dilated to three or four times the normal size; cortical and tubular substance correspondingly small in volume; several of the pyramids distorted and crooked in direction, but their basic line always distinct; cortical substance pale; malpighian bodies and striæ destitute of blood; surface smooth, but more adherent to capsule than usual. On careful examination with the naked eye, a considerable number of cysts from the smallest visible size up to ¼ inch diameter are observed in the cortical substance, especially near the surface. The *bladder* of normal size; all its walls much thickened; the mucous membrane presents a soft fungoid-looking ulcerated mass, in which no peculiar or characteristic structure could be observed. All parts of the mucous membrane were equally diseased.

Microscopic Examination.—The cysts in the kidney can be traced down to very minute sizes (the smallest observed was about the 600th of an inch in diameter), having the usual appearance of such cyst formations. The malpighian bodies shrunk, bloodless and opaque, without apparent morbid deposit, but with thickening of their membrane and nuclei. In some of the tubes similar thickening and epithelial engorgement, producing an appearance of opacity in the tubuli without any recognisable granular deposit. When the tubules are washed out and examined separately, they appear (most of them) smooth. Epithelium small and compressed, but, generally, regularly disposed and normally developed. In a few places, traces of granular and molecular exudation, but to an insignificant extent.

Commentary.—The complication of renal and vesical disease here met with, is by no means an uncommon one in aged persons. Its existence leads to obstruction of the ureter, at its entrance into the bladder, distension of the ureter above, accumulation of urine in the pelvis of the kidney, and, as a consequence, inflammation and distension of its mucous lining walls, pressure on the secreting portion, and atrophy of its substance. Such a lesion, if it exist in both kidneys, must necessarily at last so interfere with their functions, as to be incompatible with life. The chronic disease of the bladder, on which the renal disease for the most part depends, only admits of palliative measures for its relief.

Cystic disease of the kidney may originate in various ways,—1st, From greater or less obstruction in the tubuli uriniferi, and consequent accumulation of the fluid above, forming cystic collections. 2d, It may originate in the sacs surrounding the malpighian bodies, the fluid accumulating in them producing distension, and so causing cysts. 3d, In the enlargement of the secreting cells of the organ, which here, as in the ovary, become distended with fluid, and by pressing upon, compress one another.

1. The obstructions found in the tubuli uriniferi are of various kinds, and may consist of coagulated exudation, of pus, of blood, of altered epithelium cells, or of different salts, such as urates, carbonates, phosphates, etc. etc. The bloody points so frequently observed on the surface of diseased kidneys, most frequently arise from extravasation of blood into the convoluted extremities of the tubes. Small calculi may be formed from mineral deposits, but more commonly the tubular cones present a diffused white appearance from their occurrence. That such a condition is a frequent source of cysts, may be easily proved by examination. The cysts so formed may be of different sizes, varying from that of a millet seed to that of an orange, and the destruction of the secreting portion of the kidney will, of course, be proportionate to their volume and number. The contents of such cysts are also of various kinds, such as serum, blood, pus, fibrous exudation, colloid and fatty matter, fluid holding various crystals in suspension, whether fatty (cholesterine or margarine), or saline (phosphates, urates, etc.) I have frequently seen all the forms in the following figure (Fig. 412), and occasionally the radiated bodies represented Fig. 280.

2. That numerous cysts may form from distension of the minute sacs surrounding the malpighian body, I have satisfied myself of by careful examination, and possess preparations demonstrating the fact. In this case, the cysts are generally numerous and scattered through the cortical substance. It would appear to arise from some obstruction

at the commencement of the excreting duct, although I have never been able to detect any. Fluid collects outside the membrane in immediate contact with the tuft of vessels constituting the malpighian body, and inside another membrane continuous with the basement membrane of the latter. Indeed, it is in cases of this kind that we may satisfy ourselves that the membrane investing the tuft of vessels is really double, forming a shut serous sac, in the cavity of which the fluid accumulates. This fluid is invariably clear, varies in quantity, but each cyst seldom exceeds a small pea in size. As it forms, it gradually presses on the vascular tuft, and causes its atrophy, and so impedes the secretory power of the organ.

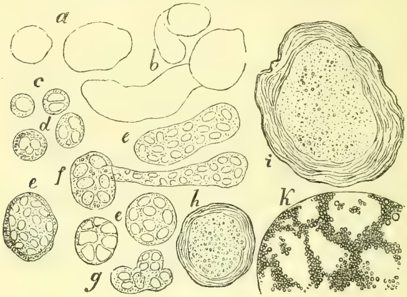

Fig. 412.

3. The third form of cystic formation in the kidney evidently originates in the secreting cells themselves, as they may be seen, on a microscopic examination, to exist in clusters, varying in size from the 600th to the 16th of an inch in diameter. In such a case, the parenchyma of the organ seems to be infiltrated with them, and strongly reminds the observer of a section of the ovary, loaded with Graafian vesicles. Many still retain their nucleus, whilst in others it has disappeared. Mr. Simon of London, who first described this form of cystic formation, says, as explanatory of its formation, "that certain diseases of the kidney (whereof subacute inflammation is by far the most frequent), tend to produce a blocking of the tubes; that this obstruction, directly or indirectly, produces rupture of the limitary membrane; and that then, what should have been the intra-tubular

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Fig. 412. Structures occasionally seen in cysts of the kidney; *a* and *b*, Structureless transparent colloid masses; *c* to *g*, Colloid bodies, composed of one or more nuclei, imbedded in albuminous matter; *h* to *i*, Colloid masses, surrounded by concentric laminæ; *k*, A colloid mass, with fatty granules arranged in an areolar manner.—(*Wedl.*) 350 *diam.*

cell-growth, continues, with certain modifications, as a parenchytic development." *

One or all of these forms of cystic growth in the kidney may be associated with the next lesion to be treated of, viz., Bright's disease.

PERSISTENT ALBUMINURIA, OR BRIGHT'S DISEASE.

That albumen in urine was a symptom of certain dropsies, was first noticed by Dr. Wells of St. Thomas's Hospital,† and Dr. Blackhall of Exeter; that it indicated especially renal dropsies, was the discovery of Dr. Bright, who has given us a careful account of the phenomena which characterize the disease that has since borne his name, as well as of the changes observed in the kidney after death. The subsequent observations of Christison, Martin Solon, Rayer and others, as well as the more recent investigations of Gluge, Johnson, Simon, Frierichs and others, have rendered it certain that the lesions of the kidney accompanying albuminuria are various. Some are dependent on what may be considered an acute or chronic form of inflammation (See Nephritis), whilst others must be referred to what we now call the fatty and waxy degenerations. In selecting the following cases as illustrative of the disease, I have kept in view its natural progress, and endeavoured to show how, by judicious treatment, it sometimes terminates in recovery; how at other times it frequently becomes obstinate, and in what manner it may ultimately cause death. Of the pathology and treatment I shall speak separately, after describing the facts we have studied at the bedside.

CASE CLXI.‡—*Albuminuria—General Anasarca—Œdema of Lung—Recovery.*

HISTORY.—Elizabeth Brady, æt. 30, cook, married—admitted March 19th. She states that her health was good until four weeks ago, when, after exposure to cold and wet, she was seized with pains in the chest and cough, but without shivering. Three days afterwards her feet began to swell, and gradually the swelling extended upwards, involving her whole body.

SYMPTOMS ON ADMISSION.—On admission, chest well formed; breathing slightly laboured. On percussion, unusual resonance is perceived over the upper portion of both sides anteriorly. There is marked dulness on the left side below the nipple and lower angle of scapula. On applying the stethoscope over the portion marked as dull, fine crepitation is perceived. Elsewhere on the left side, the inspiration is harsh and the expiration prolonged; pulse 100, small and hard; cardiac sounds normal; tongue covered by a brown fur; complains of nausea and disinclination for food. The abdomen is distended with fluid, and she has pain in the epigastric region; bowels constipated; urine rather scanty, sp. gr. 1028, is turbid when voided, and on standing deposits a copious sediment, which, when placed under the microscope, presents chiefly amorphous urate of ammonia, with a few tube-casts. On the application of heat and nitric acid a large coagulum is thrown down. Catamenia regular. Her skin is hot; her face flushed and swollen; she suffers from general anasarca; her lower extremities, however, being especially affected and pitting easily on pressure.

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* Medico-Chirurgical Transactions, vol. xxx. p. 152.

† Trans. of a Society for promoting Medical and Surgical knowledge, vol. iii. pp. 147, 167.

‡ Reported by Mr. W. W. Clark, Clinical Clerk.

PROGRESS OF THE CASE.—*March 21st.—Ordered to be bled at the arm to the extent of twelve ounces.* ℞ *Pulv. Doveri.* ℈i. *Tales* vi. *One to be taken at bed-time. March 22d.*—Fifteen ounces of blood were withdrawn from the arm, and the pulse shortly fell to 70. She expressed herself as greatly relieved. After taking the Dover's powder she had a short sleep, but no diaphoresis was produced. The blood withdrawn presents no buffy coat; her urine is voided in larger quantity, but still deposits a considerable sediment; pulse 90, soft and weak. ℞ *Potass. Acet.* ʒi; *Spt. Æth. Nit.* ʒvi; *Syrup. Aurantii* ℥i; *Aquæ* ℥iv. M. *One ounce to be taken three times a day.* ℞ *Pulv. Gambogiæ* gr. v; *Potass. Bitart.* ʒij. M. *To be taken at bed-time. March 23d.*—Her bowels have been well opened, and her general appearance is greatly improved, her face being much less swollen; urine less turbid, and in larger quantity. *Intermittatur Mist.* ℞ *Pil. Scillæ et Digital.* xii. *One to be taken every sixth hour. March 24th.*—Her cough has abated greatly, and she feels herself much better. *Repetat. Pulv. Gamb. et Potass. Bitart. vespere. March 26th.*—Urine deposits very little sediment on standing; and, under the microscope no tube casts can be detected; sp. gr. 1018. A slight coagulum is produced on applying heat and nitric acid. Her appetite is greatly improved. *March 29th.*—On examining her chest to-day, the dulness on percussion, which previously existed on the left side, cannot now be detected, and on auscultation over that portion the respiratory murmur is heard normal. Under the right clavicle the inspiration appears unusually harsh. Her urine presents the same character as at last report. *Repetantur Pil. Scillæ et Digital. et Pulv. Potass. Bitart.* ʒss *ter indies. April 3d.*—She is now nearly convalescent, and has taken no medicine for two days. To have steak diet. *May 8th.*—Complains to-day of pain in the epigastrium and of vomiting; bowels constipated; pulse natural; urine yields *no* coagulum to the usual reagents; sp. gr. 1008; contains no tube-casts on microscopic examination. Menstruation rather frequent, and in the intervals of the catamenial periods, she is subject to a leucorrhœal discharge. ℞ *Naphthæ Medicinal.* ʒi; *Tinct. Cardam. Co.* ℥i; *Aquæ* ℥v. M. *A table spoonful to be taken when the vomiting is troublesome.* ℞ *Magnesiæ Carb.* ʒss; *Aq. Cinnam.* ℥i; *Infus. Sennæ Co.* ʒij. M. *Ft. haust. hora somni sumendus. Intermittantur alia. July 20th.*—Since last report her urine has remained entirely free of albumen. The œdema has now for the most part entirely disappeared, but still returns slightly after she has been sometime in the erect position. General health good. Dismissed.

Commentary.—On succeeding Dr. Christison in the charge of the clinical wards on the 1st of May 1854, I was informed that this was a case of Bright's disease. On the 8th of the month, however, as stated in the report, on examining her urine, I found it to contain no albumen on the addition of heat or nitric acid, while the sediment, carefully collected, exhibited no tube-casts under the microscope. On looking into the history of the case, however, as recorded in the ward-book, and which is given above, it became clear that the woman had undoubtedly been labouring under albuminuria and chronic renal disease, which, well pronounced March 21st, had entirely disappeared at the beginning of May. But the œdema of the feet continued, with stomachic derangements; the former symptom exhibiting a tendency to return, on assuming the erect position for any time; and, in consequence, she was not dismissed until the 20th of July. Before saying anything with regard to the treatment, it will be well to attend to the facts exhibited by some other cases.

CASE CLXII.*—*Albuminuria—Œdema of both feet and legs, left arm and hand—Recovery.*

History.—Robert Lindsay, æt. 62, carder of wool—admitted 21st March 1854. States that, twenty-three years ago, he had a violent attack of rheumatism, which laid him up for ten months. After his recovery, his health continued good, until ten years ago, when he began to suffer from symptoms of stone in the bladder. He underwent the operation of lithotomy, but made a tardy recovery, being unable to resume his work until upwards of twelve months afterwards, and for two or three years subsequently he was subject to attacks of rigors, which compelled him to keep within doors for several days at a time. He then became tolerably healthy, and continued so until three weeks ago, when he noticed his left wrist somewhat swollen, and in the course of two days, his lower extremities became likewise œdematous. He suffered from a dull heavy pain in the lumbar region; which has been present more or less ever since he underwent the operation ten years ago. His urine, at the time the swelling commenced, was scanty and high coloured, and he was troubled with a slight cough. He says that about the time when his illness began, he was engaged in cleaning machinery, and may have caught cold. He is not aware of any other cause which might have brought on his ailment. He acknowledges that formerly he was a free liver, but since the operation he has been very temperate.

Symptoms on Admission.—On admission, both feet and legs are œdematous, pitting on pressure. There is also slight swelling of the left arm and hand. He complains of a dull pain in the lumbar region on both sides, but that on the left is most severe. Micturition frequent; he is obliged to rise several times in the course of the night for that purpose. It is not attended with pain or difficulty. Sp. gr. of urine 1011; coagulable by heat and nitric acid. He complains of frontal headache. Sleeps badly, being much disturbed by dreams and sudden startings. Tongue moist and clean; complains of great thirst; appetite impaired; bowels regular; has a slight cough, with very little expectoration; chest everywhere resonant on percussion. At the apices of both lungs anteriorly, and at the apex of the left posteriorly, sibilant rales are heard. He has suffered from palpitation for the last three weeks, but the cardiac sounds are normal. ℞ *Tinct. Ferri Mur.* ℥i. *Ten drops to be taken three times a day.* ℞ *Pulv. Doveri* gr. x. *Mittant. tales*, vi. *One to be taken morning and night.*

Progress of the Case.—*March 23d.*—This morning he had violent vomiting, but it has now abated, and he complains of great thirst. *March 26th.*—Ordered pills of digitaline, each containing 1-74th of a grain. One to be taken three times a day. *March 28th.*—After taking the pills of digitaline twice, excessive purging came on; their further use was therefore abandoned. The urine was very slightly increased in quantity. *April 4th.*—The use of digitaline was resumed four days ago, and now the coagulability of the urine has entirely disappeared. The œdema of his lower extremities has abated greatly. The purging, caused by the digitaline, was counteracted by opium pills. *May 3d.*—Since last report the urine has been several times examined, and was always found to be free of albumen. To-day only the slightest haze is caused by heat and nitric acid; the urine is pale coloured; sp. gr. 1014, transparent, and without sediment on standing; 84 oz. are passed in the twenty-four hours. The œdema has not entirely disappeared from the feet and ankles. He continues to take the digitaline pills. His general health is much improved. *May 11th.*—Two days ago he was ordered the following:—℞ *Tinct. Ferri Mur.* ℥i. *Fifteen drops to be taken thrice a day.* To-day he has passed 54 oz. of urine. The œdema of his feet and ankles is abating. A few minute flakes are produced on treating the urine by heat and nitric acid. *May 13th.*—78 oz. of urine were voided during the last 24 hours. ℞ *Spt. Æth. Nit.* ℥iss; *Aq. Potass; Tinct. Digital.* āā ℥ij. M. *A tea-spoonful to be taken thrice a day. Contin. Tr. M. Ferri.* *May 19th.*—Amount of urine passed during the twenty-four hours is 100 oz. *June 22d.*—Œdema of legs almost entirely gone; 68 oz. of urine passed during the last twenty-four hours; sp. gr. 1014; quite unaffected by heat and nitric acid. *June 26th.*—His feet and ankles are slightly œdematous at night; 60 oz. of urine passed during the last twenty-four hours; sp. gr. 1017. No coagulum produced by heat and nitric acid. *July 11th.*—Dismissed quite well.

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* Reported by Mr. Robert Bird, Clinical Clerk.

Commentary.—In this case also, we can have no doubt of the existence of Bright's disease, although I found no albumen in the urine, and the patient rapidly recovering on my succeeding Dr. Christison in the clinical wards. Digitaline had been tried, with the effect of producing excessive purging, and slight increase of the urine. The albumen shortly afterwards disappeared from that fluid, but here, as in the last case, the œdema continued, and he subsequently became quite well. These two cases, therefore, indicate that purgatives and diuretics are sometimes very efficient in entirely removing the disease. The following case, which is the most remarkable recovery I ever saw, proves that the latter alone may occasionally produce a cure.

CASE CLXIII.—*Third Attack of General Anasarca with Albuminuria—Enormous Dropsical Distension of the Abdomen, Scrotum, and Inferior Extremities—Complete Recovery under the Action of Supertartrate of Potash.*

HISTORY.—William Herdmann, æt. 49, single, a lithographer—admitted March 31, 1855. Patient admits that he has been a man of rather intemperate habits, although this has not been the case of late. Twelve years ago, without any premonitory symptoms, he was suddenly seized with general anasarca and with ascites. For this he entered the Infirmary, and after treatment was dismissed "Cured." Six years after the first, he suffered from another attack, which was also cured in the Infirmary. Within the last fortnight he has been again attacked by "dropsy," which has been gradually increasing.

SYMPTOMS ON ADMISSION.—On admission, the quantity of urine passed is small, but he is not obliged to rise during the night to pass his water. No pain in loins, or tenderness on pressure. Abdomen is considerably swollen, especially at the lower part. Circular measurement below umbilicus, 30½ inches. When he lies on his back, the anterior part of the abdomen is tympanitic, and the flanks dull on percussion. On turning him to either side, the one which is uppermost becomes clear on percussion, and the undermost remains dull. There is slight œdema of the ankles, but he notices, every morning, some puffiness in the cheeks, especially on the right side (that on which he usually lies). Bowels rather costive; appetite very bad; tongue foul, and covered with a thick brown fur; considerable thirst; complains of cough and shortness of breath; expectorates a little frothy mucus. Percussion of chest anteriorly resonant on both sides. On auscultation in front, there is heard on both sides harsh inspiration, attended with very prolonged expiration. Posteriorly, at both bases, there are loud sibilant and crepitating rales. Heart sounds indistinct; no murmur; pulse 68, of good strength; sleeps well; has complained a little of drowsiness for the last few days; skin dry and harsh. *Urine* very scanty; has only passed 12 oz. since admission. The application of heat converts the whole quantity in the test tube into a firm coagulum; sp. gr. 1024. Casts of tubes and oil globules are found in the sediment. *Descendat in Balneum Calidum vespere. Capiat Pil. Scillæ et Digitalis* j. *ter in die.* ℞ *Tr. Opii Ammoniatæ; Sp. Lavendulæ Co.* āā ʒss; *Mist. Scillæ* ℥v. M. *Sumat* ℥j *ter indies.*

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* Reported by Mr. Robert Byers, Clinical Clerk.

Progress of the Case.—*April 4th.*—Has passed 16 oz. of urine during the last twenty-four hours. Swelling of abdomen increased; it measures below umbilicus 33 inches. He is very thirsty. *April 5th.*—Only 9 oz. of urine passed since last report; sp. gr. 1018; highly coagulable; bowels costive; tongue dry and furred; cough still present, with expectoration of tough frothy mucus; sibilant and crepitating rales still heard at bases of both lungs posteriorly. *Repeat the warm baths. Injiciatur enema fœtidum. Habeat Pulv. Ipecac. Co.* gr. x. *hac nocte, et repetatur cras mane. April 6th.*—Obtained little relief from the injection; skin of chest, abdomen, and loins pits upon pressure. Abdomen measures 34¾ inches in circumference; passed only 9 oz. of urine since last report, of same character as before. Breath has a urinous odour. *Continuantur Pil. Scillæ et Digitalis, et capiat Potas. Bitart.* ʒj *ter in die. Repetatur Pulv. Doveri. April 15th.*—Urine passed daily has been from 8 to 15 oz., of sp. gr. about 1020, and highly coagulable. *Omittantur Pill. Scillæ et Digitalis. To apply spongio-piline constantly to the abdomen, saturated with a strong solution of Infus. Digitalis. April 22d.*—Urine not increased in quantity, varies from 9 to 15 oz. per diem; abdomen measures 37½ inches. The Inf. Digitalis has produced a rash of a papular character over the surface of the abdomen. ℞ *Sp. Æth. Nitrici* ʒvj; *Aq. Cinnamomi* ℥vss. M. *Habeat* ℥j *ter indies. April 25th.*—Says that the last mixture has given him great relief; has passed 26 oz. of urine after it. The spongio-piline to be removed, owing to irritation which it has caused in the skin of abdomen. *May 2d.*—Left base of lung dull on percussion posteriorly; no rale; a good deal of pain in abdomen; bowels costive; skin dry; has passed 25 oz. of urine to-day. *May 3d.*—Urine 24 oz.; *Habeat Potass. Bitart.* ℈j *ter indies. Omittantur alia. May 5th.*—Urine 18 oz.; swelling of abdomen much increased, thighs and legs greatly distended. Abdomen measures forty inches in circumference. Had *Pil. Rhei Co.* gr. x. last night. *To take Gin* ℥j *daily. May 7th.*—Urine 20 oz.; sp. gr. 1018; his condition at present seems almost hopeless. The abdomen is enormously distended, with a peculiar diffuse indurated feel over the region of the epigastrium, which, however, is tympanitic on percussion. The scrotum, thighs, and legs are greatly enlarged; appetite impaired; the pulse 86, weak. To be dry cupped over the loins. To have Gin ℥ij daily, *May 9th.*—No change. *Habeat Potass. Bitart.* ʒss *ter indies. May 11th.*—Urine 34 oz.; sp. gr. 1015; still highly coagulable; numerous casts of tubes are seen in the urine under the microscope. *May 15th.*—Urine 38 oz.; sp. gr. 1014; is less coagulable; complains of severe frontal headache. *To continue with the*

Bitartrate of Potass. May 16th.—Urine 64 oz.; Sp. gr. 1010. *May 17th.*—Urine 58 oz.; sp. gr. 1013; no headache; bed sore on sacrum; right side more swollen than left (he lies on this side); bowels costive. *Habeat Pil. Colocynth Co.* gr. x *hora somni. May 18th.*—Urine 67 oz.; œdema of limbs very much diminished; swelling of abdomen less. *May 21st.*—Urine 68 oz.; Sp. gr. 1010; appetite good; pulse 96, full and strong. *May 22d.*—Urine 120 oz. *May 23d.*—Urine 128 oz.; sp. gr. 1014; it still contains albumen in considerable quantity; the abdomen has greatly diminished in size, and the thighs and legs are of natural appearance, though there is some pitting on pressure at the ankles; every second day of late he has been attacked about noon with a severe frontal headache. ℞ *Quinæ Sulphatis* gr. iij *ter die sumend. May 24th.*—Urine 107 oz.; sp. gr. 1018; still contains much albumen; no headache. *May 25th.*—Urine 126 oz.; sp. gr. 1016; very slight headache to-day; has taken four of the quinine powders. Still takes the Bitartrate of Potass. *May 28th.*—Urine 100 oz.; sp. gr. 1020. *May 30th.*—Urine 50 oz. *May 31st.*—Urine 80 oz.; sp. gr. 1014; perfectly free from all trace of albumen; œdema of legs and ascites have completely disappeared; no headache; appetite good. *June 8th.*—No return of albumen in urine; quantity varies from 60 to 114 oz. daily. *June 9th.*—A slight trace of albumen in the urine to-day, and feet slightly œdematous. *June 15th.*—Still a faint trace of albumen in the urine; his ankles become œdematous if he sits up long. *June 19th.*—Urine 100 oz. in twenty-four hours; sp. gr. 1010; contains an exceedingly faint trace of albumen. *June 27th.*—The quantity of urine passed in twenty-four hours averages 100 oz.; sp. gr. varies from 1010 to 1015; his ankles after he has been long up pit slightly on pressure. *July 2d.*—Albumen has quite disappeared; bandaging prevents his ankles from swelling. He sits up the entire day. The appetite is good. Urine passed daily about 40 oz. In fact he is quite well. *July 3d.*—Dismissed cured.

Commentary.—In this case the man described his dropsy as being the third attack of the kind he had experienced, although it was by far much more severe than the preceding ones. I found him in the ward at the same time that I did the two preceding cases, but, unlike them, the treatment seemed to have been of no avail. The abdomen was enormously distended from fluid collected in the peritoneum and the scrotum; the thighs and legs were also so greatly swollen from dropsy, that to all appearance the case was hopeless. The urine, when heated, presented almost a solid mass of albumen, as if it had been serum of the blood, and the sediment exhibited, under the microscope, numerous fatty cells, and casts of the tubes, proving the disease to be renal. A singular circumstance is, that from his admission in March, until May 11th, notwithstanding, a diaphoretic, purgative, and diuretic treatment had been employed, he continued to get worse, and the anasarca increased. In April also he had taken the bitartrate of potass in drachm doses without benefit. But after I resumed the same remedy in May, in half drachm doses, its diuretic effect was extraordinary. From the 11th to the 28th of May, the quantity of urine was greatly increased, and I ordered it to be measured daily. On some occasions 126 oz. of fluid were voided, and coincident with this diuretic effect, the enormously swollen abdomen, scrotum, and inferior extremities diminished in size, and gradually returned to their normal condition. On the 31st of May there was no albumen in the urine. The ankles still remained puffy, especially after sitting up for any time, but on the third of July he was dismissed perfectly well.

The anasarca in this case had reached its ultimate limits, the scrotum was as large as an adult head, the prostration of the patient was extreme, and we daily feared the coming on of coma, and sloughing sores on the back. Although dry cupping was tried over the loins, on the 7th of May, I have myself no doubt that the good effects are entirely to be attributed to the diuretic ordered on the 9th, and the increased discharge of fluid from the kidneys which followed.

The cases now recorded, in which advanced Bright's disease was perfectly cured, exhibit the groundlessness of the fears entertained by some as to the use of diuretics in that disease. In all they were freely employed, and it may be observed that improvement invariably coincided with the coming on of the increased flow of urine. The case of Herdmann (Case CLXIII.) is extraordinary in this respect.

CASE CLXIV.*—*Second Attack of Albuminuria with Anasarca—Dismissed relieved.*

HISTORY.—Mary Donaghan, æt. 43—admitted July 12th, 1854, out worker. She states that three weeks ago, she came home from her usual employment in the open fields in good health, but awoke next morning with pain in the epigastric region, and found her legs, arms, body, and face, much swollen. She was not aware of having been exposed to unusual cold or wet previously, and had no shivering. She had no pain in the loins, and passed her urine in usual quantity. Two years ago, she was admitted into this hospital, suffering in the same way as at present. The swelling of her body at that time, however, was much greater.

SYMPTOMS ON ADMISSION.—On admission, her lower extremities only are œdematous, pitting on pressure. Her skin is moist and she perspires moderately. Urine passed in normal quantity. On standing, a thick white deposit subsides, which, under the microscope, is seen to consist of epithelial scales, numerous tube-casts filled with oily globules, and compound granular bodies. Urine deposits a considerable coagulum by heat and nitric acid, also an abundant precipitate of chlorides by nitrate of silver ; sp. gr. 1012. She complains of pain on pressing firmly the left lumbar region. Her tongue is moist at the edges, and furred in the centre. She complains of thirst, and bad appetite. Epigastric region somewhat tender on pressure. Bowels constipated. ℞ *Pulv. Potass. Bitart.* ℥ss ; *in Pulv.* xii. *Divid. One to be taken three times a-day.*

PROGRESS OF THE CASE.—*July 23d.*—Conjunctivæ somewhat inflamed. Two leeches to be applied to external angle of both eyes. *July 26th.*—Conjunctivitis less acute. ℞ *Nit. Argent.* gr. ij ; *Aquæ* ℥i. *Ft. Collyrium. August 2d*—Her eyes are now nearly well. Urine still very coagulable, and its general characters are much the same as on admission. The œdema of the legs is abating a little. *Aug. 15th.* She has been sweating profusely for the last few days. The characters of the urine are much the same as at last report. The œdema disappears almost entirely when she retains the recumbent posture for some time, but returns again when she walks about. She continues to use the powders of Potass. Bitart. *Aug. 21st.*—Urine pale coloured ; sp. gr. 1012. Yields a considerable coagulum on the application of heat and nitric acid. The swelling of her legs has abated very much. Scarcely any pitting can be produced, except after she has been walking about a good deal. Her general health is very good. She is able to be out of bed during the whole day, and is now anxious to be dismissed. *Aug. 21st.*—Dismissed relieved.

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* Reported by Mr. James Thorburn, Clinical Clerk.

Commentary.—In this case the same diuretic treatment we have previously seen to be so beneficial, produced great relief in the short space of eleven days, and rapid disappearance of the anasarca. No doubt every symptom would have soon disappeared, had she not insisted on leaving the Infirmary.

CASE CLXV.*—*Second Attack of Albuminuria after an interval of twenty-nine years, with Anasarca—Bronchitis—Dismissed relieved.*

HISTORY.—James M'Kay, æt. 62, armourer—admitted January 6th, 1853. He states that he enjoyed excellent health, till twenty-nine years ago, when he was admitted to the Royal Infirmary, under Dr. Spens, for swelling of the limbs, trunk, and face, supervening after exposure to cold and wet. He continued under treatment for nine days, when he was dismissed cured, and since then, he has continued free from any complaint, till about five weeks ago, when he observed that his urine was diminished in quantity, was of a high colour, and deposited a thick white sediment. A few days after, he was exposed to cold while perspiring, having freely indulged in spirituous liquors. This was followed by distinct rigor, lasting for a short time, and followed by general uneasiness and feverishness, with headache and feeling of soreness in the loins. Ten days after the rigor, swelling appeared in the feet and gradually increased, extending to the legs, thighs, and scrotum, but during the last few days, the œdema has considerably diminished. He has been a good deal addicted to the use of ardent spirits, for the greater part of his life.

SYMPTOMS ON ADMISSION.—On admission, the skin is soft and dry; the legs are somewhat œdematous, and pit on pressure. The urine is passed more frequently than usual, and in small quantities at a time; the whole amount of urine voided is considerably under the normal standard; it is of a pale colour; sp. gr. 1012; highly coagulable with heat and nitric acid; no distinct sediment is deposited on standing. He has no pain at present in the situation of the kidneys or bladder; tongue dry; has no appetite, but troublesome thirst; bowels regular; pulse 96, natural; heart's sounds normal; he has some cough and dyspnœa on exertion, but the chest is otherwise normal; other functions natural. *To have warm bottles applied to the limbs and feet, with twelve grains of Dover's powder at night, followed by a draught of twenty-five minims of Morphia if he does not sleep.*

PROGRESS OF THE CASE.—*January 9th.*—Slept towards morning after the morphia; no sweating; urine coagulable as before; sp. gr. 1018; passed without pain or difficulty, and in good quantity, viz., 48 oz. The œdema has quite disappeared from the limbs; bowels costive. *Ordered two Colocynth and Hyoscyamus pills. Jan. 12th.*—On the 10th, he was much in the same state; no sweating; appetite bad; great thirst, for which he was ordered *milk and lime water.* Being no better last night, he was *ordered the warm bath, followed by fifteen grains of Dover's powder.* To-day he states that he felt more weak after the bath, had slight perspiration, which was confined to the face and legs. *To have twelve grains of Dover's powder, with six of James' powder at bed time. Jan. 14th.*—The diaphoretic has been continued since last report, but no sweating has been produced; passed, during the last twenty-four hours, 58 oz. of urine; bowels are rather costive. ℞ *Bitartratis Potassæ* ʒiss; *Pulveris Gambogiæ*, gr. iv. M. *To be taken immediately, and repeated in six hours if necessary. Jan. 17th.*—The bowels were well opened on the 15th, the stools being of thin consistence after the second powder, which afforded considerable relief; but they have not been opened since; appetite still bad, but less thirst. The urine to-day is of nearly natural colour; sp. gr. 1022; quite as coagulable as before; the quantity passed in the last twenty-four hours is 58 oz., with a slight sediment of urate of ammonia. *Ordered a scruple of Bitartrate of Potass three times a day. Jan. 19th.*—The quantity of urine passed yesterday was 60 oz., but to-day it has diminished to 36; he complained of much thirst, and was ordered *cream of tartar water as a drink;* he did not sleep well during the night, and is somewhat incoherent in his remarks to-day; though quite sensible when promptly spoken to; bowels still costive; *repeat the powder of Bitartrate of Potass and Gamboge; to have ten grains of Dover's powder after the bowels have been well opened. Jan. 20th.*—Was a good deal better last night, felt himself warm and comfortable after the Dover's powder, but he did not sweat; he has had three loose stools since; the quantity of urine is now 50 oz.; sp. gr. 1020; still highly coagulable; his thirst is considerably diminished. *Jan. 22d.*—The urine examined under the microscope yesterday exhibited a few pale casts of the urinary tubes, which are also present to-day; during the last two days he has passed about 58 oz. of urine in the twenty-four hours, and he states that altogether he feels much better. *March 5th.*—Since last report has gradually improved in health. To-day, wishes to go out, as he now has no complaint but weakness; voids from 50 to 60 oz. of urine daily. It is of rather pale colour; sp. gr. 1020; about one-sixth coagulable. A few sibilant rales are heard occasionally over the chest, but otherwise the systems are healthy. Is dismissed accordingly much relieved.

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* Reported by Mr. Wm. Calder, Clinical Clerk.

Commentary.—In this case the diaphoretic plan of treatment was tried at first, but with inconsiderable success. It is true the œdema disappeared from the legs, a result probably as much owing to the recumbent position and general comforts of the hospital, as to the medicines employed. When the bitartrate of potash was administered, afterwards combined with purgatives, the effects were more rapid, and the anasarca soon disappeared. The coagulability of the urine, however, still continued, though in a diminished degree, when he left the house.

CASE CLXVI.[*]—*Third Attack of Albuminuria with Anasarca—Dismissed relieved.*

HISTORY.—James Smith, æt. 38—admitted 25th November 1852. States that he enjoyed good health till about three and a half years ago, when after exposure to a draught of cold air, his ankles began to swell, which in four days extended up to the thighs, and induced him to apply for admission to the hospital, where he remained three weeks, and was dismissed cured. The same symptoms reappeared in twelve months, and he was again admitted a patient, remained for a few weeks and went out, feeling quite well. He continued in excellent health till four months ago, when he began to complain of shortness of breath and palpitation when at work; the palpitation was reduced by cupping, but the dyspnœa continued upon taking exertion.

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[*] Reported by Mr. Alexander T. Macarthur, Clinical Clerk.

Four weeks ago the swelling at the ankles returned, and he was again admitted into the hospital, ward 6, where he has been under treatment till the date of his admission into the clinical ward. His habits were rather intemperate previous to his first attack, but since then he has never indulged in any kind of intoxicating liquors.

Symptoms on Admission.—On admission there is some œdema of the limbs and trunk, which pit slightly on pressure; the skin generally is very dry, but of the usual temperature. The quantity of urine voided in the twenty-four hours is 66 oz.; it is of a pale straw colour, slightly turbid, and highly coagulable; sp. gr. 1014, depositing a slight sediment like thin whey. Viewed under the microscope, it presents numerous fragments of desquamative casts; some very long, some containing nuclei and granular cells more or less fatty, and some filled with minute fatty molecules. There are numerous pus cells; some epithelium cells, isolated and in groups, from the ureter or bladder. There are numerous columnar crystals of uric acid, and some mineral salts aggregated in masses of minute angular crystals. Tongue clean and moist; appetite good; bowels regular; pulse 68, of moderate strength. There is slight irregularity of the heart's action; first sound prolonged, and accompanied with a soft blowing murmur heard loudest at the apex. Other functions normal.

Progress of the Case.—He was dismissed at his own desire on the *29th of November*, but returned with all his former symptoms aggravated on the *27th of December*. He states that after leaving the hospital he returned to his usual employment for about a week, when he caught cold, and he has been confined to the house ever since. The cough became very severe, with dyspnœa and great debility after passing his urine. On examination, the quantity of urine excreted is 50 oz.; it is passed without pain; is of pale colour resembling whey, is slightly turbid, and deposits, on standing, a small quantity of white sediment, which, on examination by the microscope, presents numerous casts, as before noticed, but no crystals; sp. gr. 1013, highly coagulable. On auscultation, sibilant rales are heard all over the chest, expiration prolonged, but no dulness on percussion. He has a frequent cough, with frothy mucous expectoration. ℞ *Sol. Antimonial.* ʒii; *Mist. Camph.* ℥iv; *Misce. Sumat* ʒii *quarta quaque hora. Descendat in balneum calidum secund. quaque noct. Dec. 29th.*—Still rather feverish, complains of intense thirst, constant craving for drink, which is unrelieved by water. *To have as drink* ℥xij *of milk mixed with* ℥vj *of lime water. January 1st.*—Cough much the same as on admission; œdema of legs much diminished, but the skin is still dry, diaphoresis never having been induced. About 90 oz. of urine are passed in the twenty-four hours, still very coagulable with heat and nitric acid, slight deposit, still containing granular casts of the urinary tubes. *Jan. 6th.*—Cough much relieved; pulse 68, of good strength; swelling of the legs now quite gone; urine passed in large quantity; still complains of great thirst. *Continuantur medicament. Jan. 13th.*—Voided 130 oz. of urine during the last twenty-four hours; has still considerable thirst; pulse 80, of good strength. Expresses himself as feeling quite well. On standing for twenty-four hours the urine deposits a slight sediment, in which casts of the urinary tubes are still visible, crowded with fatty granules. *Jan. 17th.*—Feels better than he has done for several years, and wishes to return home. He is accordingly ordered to be dismissed.

Commentary.—In this case it was evident that improvement had commenced on his entering the clinical ward, the urine was passing copiously, and diuretics were not directly indicated. Under these circumstances the diaphoretic plan of treatment was persevered in, and although not with the result of entirely freeing his urine of all trace of albumen, yet with such good effect, that he insisted on leaving the house, which he did nearly well.

In the last three cases it will be observed that great relief was experienced, although perfect recovery was not established. The dropsical symptoms were removed, whilst the albuminuria remained, a condition which constitutes the majority of those cases which enter into the hospital, and are dismissed as "relieved."

Case CLXVII.*—*Albuminuria, with general Anasarca, terminating fatally—Waxy Kidneys, Spleen and Liver, with Extensive Deposition of Tubercle.*

History.—Sarah Wilson, æt. 7—admitted November 11th, 1853. Three years ago she suffered from scarlatina, and has ever since been a weakly child, with a capricious appetite. In the course of last summer, œdema of the feet and legs was first observed, together with diarrhœa, which have continued more or less ever since.

Symptoms on Admission.—On admission, her countenance is puffy and pallid, and the whole surface blanched. Her feet and legs are œdematous, pitting on pressure. The urine is of a pale colour; sp. gr. 1006. On applying heat, and adding nitric acid, a coagulum is thrown down, which occupies a space in the test-tube equal to that of half the quantity of urine. She has never felt any pain in the lumbar region. Tongue moist, and covered by a slight fur; no thirst; appetite good. The abdomen is greatly distended, and affords distinct fluctuation. Pulse 86, weak and compressible; cardiac sounds normal. She has no headache, and sleeps well at night. ℞ *Acet. Potass.* ʒi; *Æth. Nit.* ʒij; *Syrupi* ʒi; *Aquæ* ℥v. M. *A tablespoonful to be taken three times a-day.*

Progress of the Case.—*November 17th.*—Diarrhœa continues, and she lies in a very weak state. ℞ *Mist. Cretae* ℥iv. *An ounce to be taken three or four times a-day. To have* 1 *oz. of Gin daily. Nov.* 25*th.*—Urine passed in great quantity; sp. gr. 1002; not so coagulable. The diarrhœa, which abated for a few days after last report, has again returned. *Ordered an astringent mixture. Nov.* 30*th.*—The puffiness of the face, which, on some days after her admission, abated considerably, is now as bad as ever. Her urine has been passed involuntarily for the last three days; the diarrhœa is less severe. *Dec.* 10*th.*—Since last report, the œdema has wholly disappeared. The fœces and urine are both passed involuntarily. The constant dribbling of the latter over the labia and nates has produced excoriation. She takes her food pretty well, but vomits it occasionally. Her pulse is very feeble, and her strength much impaired. She is at present taking 2 oz. of gin, and an equal quantity of wine daily. For the last five or six days she has been very drowsy, sleeping almost constantly, although she could easily be aroused, and answered questions readily. *Dec.* 13*th.*—The œdema has not returned, but the drowsiness gradually increased until this morning, when she expired.

Sectio Cadaveris.—Forty hours after death.

Body greatly emaciated; slight œdema of feet.

Thorax.—The *lungs*, which looked quite healthy, presented to the touch some indurated points; these, on being cut into, were found to consist of clusters of minute grey granulations, generally about the size of small marbles. At the apex of the right lung was a small cretaceous concretion. The *heart* weighed 3 oz., and was quite healthy.

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* Reported by Mr. Peter W. Wallace, Clinical Clerk.

Abdomen.—There were adhesions between the upper surface of the liver and the diaphragm. The *liver* weighed 3 lb. 16 oz. There was a little hepatic congestion, but the intervening tissue was pale ; the whole presented the usual appearance of the waxy degeneration. The *spleen* weighed 2¼ ounces, specific gravity 1054. It felt firm, and presented on section a waxy appearance. Throughout its substance were numerous enlarged semi-translucent, grey malpighian bodies, closely aggregated together. Their average diameter was about the 16th of an inch. The *kidneys* were enlarged, weighing each 6¾ oz. On stripping off the capsule they presented a mottled appearance from the presence of irregular vascularity, contrasting with the pale cortical substance. On section they presented a well-marked waxy appearance ; the cortical portion was of a pale yellowish colour ; the striæ generally absent, or indistinct. At some places there was a number of minute opaque yellowish spots. On opening the intestines, tubercular ulcers were found ; they occurred in the lower third of the small intestine, presented the usual characters, and occupied the whole circumference of the gut. The mesenteric glands were much enlarged, and were infiltrated with tubercle.

Microscopic Examination.—The liver was found to contain much fatty matter, both free and contained in the hepatic cells. But the majority of the cells were pale and very indistinct (see Fig. 278, p. 222). Thin sections of the cortical substance of the kidneys presented a very transparent appearance, particularly the malpighian bodies. At some places, there were collections of fatty granules, but this did not occur very frequently, and only in isolated points. The enlarged malpighian bodies in the spleen contained a translucent matter, closely resembling colloid, and which presented the blue reaction of cellulose, on the application of iodine and sulphuric acid.

Commentary.—This case presented all the symptoms of Bright's disease, in a young girl who had been in a state of ill health for three years, in consequence of an attack of scarlatina. On dissection after death, the kidneys, liver, and spleen were found to have undergone that chronic condition now known as waxy, and which is very commonly associated, as in this case, with tubercle. The nature of this morbid alteration I shall speak of subsequently.

Case CLXVIII.*—*Albuminuria coming on during the progress of Phthisis Pulmonalis, terminating fatally—Extensive Deposition of Tubercle—Waxy Kidney, Liver, and Spleen.*

History.—William Sibbald, æt. 31, clerk—admitted September 7th, 1852. States that, six months ago, after exposure to cold and wet, he was seized with rigors, pain in the shoulders, sore throat, and hard dry cough. Has not enjoyed good health for many years past, having been very liable to catch cold on the slightest exposure, followed by slight cough, which was sometimes attended with expectoration, and pain in the side. During the last six months, the above symptoms have become much aggravated, and, for some time back, he has suffered from dyspnœa, occasional night sweats, frequent nausea, and loss of appetite.

Symptoms on Admission.—On admission, there is slight flattening of the chest beneath both clavicles. On percussion, there is comparative dulness below the right clavicle, together with a cracked-pot sound ; chest elsewhere appears resonant. Below the right clavicle, very fine but distinct moist rales are heard, chiefly with inspiration ; there is also loud-pealing vocal resonance, of a somewhat metallic character. Towards the base of the lung, on the same side, the respiratory murmurs are slightly exaggerated, but otherwise normal. Below the left clavicle also, there are fine moist rales, but less marked than on the right : the breathing is harsh, and the expiration prolonged, though not to the same extent as on the right. Vocal resonance slightly increased. There is also considerable muco-purulent expectoration, but no appearance of blood. Pulse weak, 90. Tongue furred ; appetite impaired ; frequent nausea ; bowels rather costive. Urine normal, but he has frequent calls to micturition, obliging him to rise frequently during the night. Other functions appear normal. *To use the opiate linctus, when the cough is troublesome. To have a dessert-spoonful of cod-liver oil three times a-day, and full diet.*

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* Reported by Mr. Wm. M. Calder, Clinical Clerk.

PROGRESS OF THE CASE.—*October 1st.*—He has been taking the linctus, and also the oil, which, however, he has been occasionally obliged to vomit, owing to the nausea and disagreeable eructations which it produces. With the exception of some increase of harshness posteriorly, the respiratory sounds are unchanged. *Oct. 21st.*—His cough has been more troublesome for some days back, for which he had a blister applied to the chest on the 17th. His appetite is bad, and the bowels costive. *Omit the mixture. Oct. 29th.*—His appetite is now improved ; he complains of some pain in the throat ; bowels rather costive ; takes the cod-liver oil without difficulty. *December 16th.*—Since last report has been alternately better and worse, in proportion to the quantity of food and cod-liver oil his stomach has been able to retain. The disease, however, has steadily made progress. The report to-day is—Cough still continues hard and frequent. Loud gurgling rales are heard under both clavicles, but dry throughout the rest of the chest, with prolonged expiration. Vocal resonance, and dulness on percussion same as before. The appetite is very bad ; bowels have been rather loose during the last three days. Urine, of specific gravity 1012, of a dark amber colour, slightly albuminous. ℞ *Tinct. Colombæ* ℥iss ; *Liquoris Potassæ* ℥ss ; *Syrupi Aurantii* ℥j ; *Infusi Gentianæ Comp.* ℥ix. M. *An ounce to be taken three times a-day. January 1st,* 1853.—Continues much in the same state ; sleeps ill at night, and is frequently troubled with cold perspiration. Cough is very severe, with copious muco-purulent expectoration of a nummular character. Micturition frequent ; urine strongly coagulable by heat and nitric acid. Œdema of feet and legs, with puffiness of the face. *Jan. 12th.*—Feels very weak, and seldom leaves his bed ; loud gurgling is heard beneath both clavicles ; the voice is very husky, and there is some ulceration at the back of the pharynx. Appetite still very bad, and bowels costive. Takes a table-spoonful of cod-liver oil three times a-day. *To have four ounces of Wine, and a Morphia draught at night. Jan. 20th.*—Is getting gradually weaker and more emaciated. Pulse 114, of moderate strength. He has no pain in the loins, but frequent micturition ; urine of a dark amber colour, specific gravity 1012, very coagulable on the application of heat and nitric acid. *Jan. 26th.*—Since last report he continued gradually getting weaker and more emaciated. He could take no food, except a little chicken soup, and died to-day at 2 P.M.

Sectio Cadaveris.—Forty-six hours after death.

Body emaciated in the extreme ; very slight dropsy of feet.

THORAX.—Both *lungs* very firmly adherent throughout, with thickening of pleuræ to ¼ inch at upper and back parts. On incising the lungs they were found, on both sides, to present, in their upper portions, cavities containing a little pus, with thick flocculent membranes. These cavities were nowhere larger than ⅜ inch diameter and invariably surrounded by much indurated and atrophied tissue, which, in the upper lobes, almost entirely occupied the place of normal lung. In the lower and middle parts of the lung, there were many miliary tubercles quite semi-transparent, but of nearly cartilaginous hardness. No calcareous masses were observed. In the upper lobe of the left lung was a cavity near the surface, about an inch in diameter, filled with air, and lined by a smooth membrane. Several others, smaller, but of the same character, were discovered in other parts of the lung. In the thickened pleuræ there was found, at several points, an atheromatous debris, enclosed between the layers, having an opaque yellowish colour, and consisting of minute fatty granules. *Bronchial glands* were large and dark-coloured, and contained some miliary tubercles.

ABDOMEN.—*Liver* rather large, weighed 5½ lbs., very firm and dense, presented the well-marked "waxy character," but without pallor; hepatic veins well congested. At one of the thin edges the organ was deformed by the turning inwards of the edge at an acute angle. *Spleen* very firm and waxy in character; the malpighian bodies large and solid, but not easily distinguished from the pulp. *Kidneys* also very firm and dense, with partial atrophy of the cortical substance, presenting a slight degree of the waxy degeneration; surface irregular and dimpled; cortical substance, however, exhibited its natural vascularity at most points; malpighian tufts not well injected; no granulations. *Intestinal canal* presented thickly scattered tubercles, and tubercular ulcers throughout ileum, and less numerous ulcers in colon. The ulcers were not more numerous near the ileo-colic valve than for some feet above it. The vermiform appendix was impacted with fœcal matter, and presented a very extensive ulceration of its mucous membrane, leaving only about half an inch at the upper end quite intact. Numerous *mesenteric glands* were converted into calcareous masses from the size of a pea to that of a bean; others were large and pulpy, and contained tubercular matter. The *pancreas* was rather hard, but otherwise normal.

Commentary.—The albuminuria and waxy degeneration of the kidneys were observed, in this case, to come on in the ward, as a sequela of phthisis pulmonalis. Drs. Christison and Peacock have pointed out how frequently Bright's disease is a complication of phthisis, and I have not only confirmed that observation, but observed that this is, in most cases, connected with the waxy degeneration of the renal organs. The present was one of these cases of phthisis, in which derangement of the alimentary canal prevented all possibility of nourishment. The waxy transformation of the kidneys, liver, and spleen, though it had not advanced so far as it did in the last case, was sufficient, when added to the more extensive tubercular disease that existed, to prove fatal.

CASE CLXIX.*—*Albuminuria, with Phthisis Pulmonalis, terminating fatally—Extensive Deposition of Tubercle and Colliquative Diarrhœa—Atrophied Fatty Kidney—Ulcerated Intestines.*

HISTORY.—John Montgomery, æt. 60, weaver—admitted November 19th, 1852. States that for several years past he has been exposed to great privations, and that he has been frequently troubled with bowel complaint during that time. The attacks have sometimes been severe, and of long duration, but have generally lasted for a few days only. About a month before admission, the diarrhœa became much aggravated, there having been sometimes as many as twelve stools in twenty-four hours. This has continued more or less since that time, reducing him greatly in flesh and strength. As far as he has observed, he has never passed blood by stool. He has also had a short dry cough, but only for a few weeks past, and unaccompanied with expectoration or dyspnœa. He was brought into the hospital in a state of great weakness and exhaustion, having fallen down in the street, supposed to be in a state of intoxication. He states that he has not taken any spirits for some days past, although he has been much addicted to intemperance during the greater part of his life.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Symptoms on Admission.—On admission, the tongue is very dry, but not furred; but there are some sordes on the teeth and gums. He experiences difficulty in deglutition, as if there was some obstruction about upper part of sternum; appetite bad; troublesome thirst; no sickness or vomiting; no pain in epigastrium, but frequent griping pains in abdomen. Bowels are very loose; much straining and great tenesmus when at stool; evacuations of an almost watery consistence and reddish-brown colour. They present no appearance of blood, but contain a few shreds of mucus. Occasionally he passes nothing but a small quantity of frothy slime; no hæmorrhoids. On physical examination of the abdomen, the parietes are tense and retracted. The liver is slightly enlarged, the dulness measuring five inches from above downwards. Chest appears contracted, and does not expand freely. There is no comparative dulness on percussion. The respiration is feeble, and the expectoration prolonged; under the right clavicle it is of a somewhat tubular character. Vocal resonance is also increased over the same part. At the lower part of right side anteriorly there is a fine friction sound. Sputum in very small quantity; muco-purulent, untinged with blood. Pulse 124, small and feeble; heart sounds normal; urine sp. gr. 1012, becomes slightly clouded with heat and nitric acid, but no distinct coagulum is formed; other functions normal. ℞ *Sol. Mur. Morph.* ʒij; *Tinct. Catechu* ʒvj; *Mist. Cretæ,* ℥vj. M. *Sumat* ℥j *tertia quâque horâ. To have* 6 *oz. of Wine and steak diet.*

Progress of the Case.—*November 20th.*—Wandered a good deal during the night; is exceedingly weak to-day, but the diarrhœa is less severe. *Nov. 22d.*—Complains more of cough and pain in right side, striking across the chest to the left; no dulness on percussion; still friction on right side, with fine moist rales; marked increase of vocal resonance; urine diminished in quantity; of natural colour, with slight flocculent precipitate on the application of heat and nitric acid. Diarrhœa stopped; pulse 112, small and weak. *Nov. 24th.*—Was much weaker yesterday, and evidently sinking; too weak for examination of the chest; bowels were once opened; no urine voided since last report. Died this morning at four o'clock, comatose.

Sectio Cadaveris.—Fifty-six hours after death.

Body somewhat emaciated; very little subcutaneous fat; muscles well nourished.

Thorax.—*Heart* normal; adhesions of both pleuræ over limited space of upper lobes. Both *lungs* contained many scattered groups of tubercle, chiefly miliary; some few of them softened, and with small dry excavations at the apices; the pulmonary tissue around the tubercles mostly indurated and dark coloured from carbonaceous infiltration; the bronchial glands dark and enlarged.

Abdomen.—*Stomach and jejunum* and upper two-thirds of ileum normal. In lower third several scattered ulcers, not exceeding eight or twelve in number, from one-quarter to three-quarters of an inch in diameter; some of them slightly congested at edges; their characters in all respects those of tubercular ulcers. *Colon* contracted at lower part. In the ascending portion, there are four or five small tubercular ulcers; the largest half an inch in diameter, edges pale and slate-coloured, the floor somewhat indurated. *Spleen* pale, peritoneal capsule thickened, the organ rather small, no distinct morbid appearances. *Liver* slightly enlarged, presenting very distinctly, and in a considerable degree, the fatty degeneration. *Kidneys* unusually small (dimension of right three and a half inches long, one and three-quarter inches broad, three-quarters of an inch thick, left kidney of nearly the same size, weight not ascertained); capsule easily stripped off; surface slightly uneven, not distinctly tuberculated; venous vascularity of surface considerable but irregular; on section, cortical substance much diminished (average three-eighths of an inch in diameter from base of pyramids); limiting line of pyramids tolerably distinct; faint appearance of opaque granulations. On examination with a lens, many very minute cysts were discovered in cortical substance; most of them required a power of half an inch focal distance to bring them into view. A similar power, or even the naked eye, distinguished easily a number of opaque light gamboge yellow points in the cortical substance; the largest was about one-fiftieth of an inch in diameter, accurately limited, and yielding, on being punctured, a fluid of the same colour. In the cortical substance there were also some minute hæmorrhagic petechiæ, having the usual appearance of extravasation.

MICROSCOPIC EXAMINATION.—With high magnifying powers, the tubuli uriniferi were seen in some places to be of normal character, with the exception of a very few granules in the epithelium; on the contrary, in others, the tubes were crowded with fatty granules. The epithelium generally was normal in form and appearance in the tubes which had fewest granules. In many places the cortical substance of the kidney was studded with minute cysts, constituting the third form which they present (see p. 741). In the fluid squeezed from the yellow points, in the cortical substance, there was an immense number of fatty granules, partly loose, partly agglomerated into amorphous collections, partly composing distinct rounded granular masses up to the one-ninetieth of an inch in diameter, and partly contained in cells of a very fine delicate transparent character, presenting much of the appearance of a tesselated epithelium. The cells of this epithelium were more transparent, and generally one-third smaller than those usually found in the renal tubules.

Commentary.—In this, as in the two previous cases, the renal disease was associated with phthisis, but was more chronic, further advanced, and exhibited the ultimate effects of the fatty rather than of the waxy degeneration. The report states that the urine was not highly coagulable, presenting only a slight cloud on the addition of heat and nitric acid. The fluids of the body, however, seemed to have been discharged to a great extent by means of stool. Before death, the urine was suppressed, causing coma.

In the three fatal cases now given, we have seen—1st, Extreme waxy degeneration of the kidneys in a child. 2d, Incipient waxy degeneration coming on in the ward in an adult. 3d, The last stage of the fatty degeneration, with atrophy. It would be easy to multiply cases, where, on dissection, all kinds of intermediate conditions of the kidneys had been observed; but those now recorded, together with the six which recovered or were relieved, present the leading characters illustrative of the pathology, diagnosis, and treatment of Bright's disease. A few words on each of these topics may now be added with propriety.

Pathology of Bright's Disease.

Many names have been proposed by various pathologists for the disease called after Dr. Bright. Up to the present time, however, none of them have been sufficiently good to comprehend all those lesions which occasion renal dropsy, with *persistent* albuminuria. Hence we still retain the designation it has so appropriately borne, to express a disorder characterized by more or less dropsy, caused by obstruction to the renal functions, and accompanied by the presence of albumen in the urine.

The nature of the obstruction to the renal function differs under a great variety of circumstances, but such as occasion dropsy, with persistent albuminuria, it appears to me may now be classified under three heads—1st, Inflammation, acute or chronic; 2d, Waxy degeneration; 3d, Fatty degeneration.

1. *The Inflammatory Form.*—This may be acute or chronic; the first is generally induced by all those causes which excite inflammation in other internal organs, and is ushered in by rigors and febrile symptoms, and accompanied by pains in the lumbar region, and the phenomena generally described as those peculiar to nephritis (See Nephritis.) The chronic disease may follow the acute, may come on more slowly, as the result of the same causes, or proceed so imperceptibly from causes which have escaped observation, that the occurrence of dropsy, more or less extensive, may be the first symptom which excites attention. On testing the urine chemically, it is found to be albuminous, and on examining the sediments microscopically, various kinds of casts with epithelial cells, blood corpuscles, different salts, and other morbid products, may be seen. These casts of the uriniferous tubes are finely molecular and fibrinous (*exudative casts*), or mingled with the fibrinous matter, there are epithelial cells and free nuclei of the tubes (*desquamative casts*). Other products, which vary according to the period of the disorder and the tissues involved, may also be present, to which we shall allude under the head of diagnosis.

On examining the kidneys of individuals who are labouring under this form of the disease, we find that in the acute stage they are more or less congested and tinged of various colours, from a bright red to a dusky brown. The surface is not unfrequently covered over with minute ecchymotic spots, dependent on the extravasation of blood into the tubes, in their convoluted portions. The excessive congestion and extravasation of blood, by obstructing the tubes and interfering with the secreting function of the organ, is a chief source of the danger in these cases. There may also be frequently observed a fibrinous exudation filling the tubes, in which are intermixed the epithelial cells, and here again the extent of the obstruction so occasioned is (sometimes without much congestion Case CLIV.) commensurate with the danger of the case. As the disease becomes more chronic, the intense uniform coloration diminishes, leaving irregular arborizations, which mottle the surface—the blood extravasated is absorbed—the exudation, if not dislodged and passed in fragments by the urine, gradually disintegrates, and may or may not undergo the purulent or fatty transformation. This, by long-continued pressure, causes permanent obstruction of the tubes and atrophy of the renal structure, so that at last the organ becomes smaller and smaller, less and less able to perform its functions, and ultimately causes death (Case CLXIX.)

2. *The Waxy Form.*—This form of the disease is generally chronic, and for the most part accompanies scrofulous or tubercular complications. Dropsy, and a peculiarly cachectic and emaciated look, constitute its chief symptoms; and the urine, as the disease slowly progresses, becomes more and more suppressed, death taking place by coma. The sediment is usually small, and presents pale casts of the tubes (*waxy casts*), with a few epithelial cells, unusually colourless and transparent. Not unfrequently, however, at an early period, desquamative casts, with little fibrin, and composed of closely aggregated cells of the tubes, may be seen. This form of the disease is so mixed up with the various other lesions which usually accompany it, as not to admit of any distinctive description, referable to the mere renal disorder.

On examining kidneys which have undergone the waxy degeneration, we generally find that they are more dense to the feel than natural, sometimes smaller, at others larger than usual, and of a colour resembling various shades of dirty bees' wax, or of a light fawn tint. On section the surface is smooth, and the edges more or less translucent; a circumstance dependent on the diminished vascularity which everywhere prevails, and a peculiar transparency which all the structures of the organs have undergone. A thin slice, when magnified under a power of 250 diam. linear, exhibits the vessels of the malpighian bodies more transparent and refractive than usual (Fig. 413). The tubules are colourless, often destitute of epithelium, and of a peculiar whiteness. Such cells as are discovered have their nuclei more or less atrophied, and closely resemble those seen in the liver, when similarly affected (see Fig. 278, p. 222). Indeed, this change in the kidney is frequently associated with a similar transformation of the liver and spleen. The nature of this waxy degeneration of tissue is unknown, although pro-

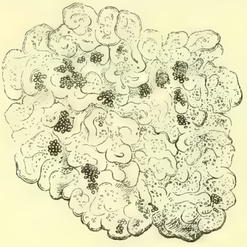

Fig. 413.

Fig. 413. Waxy degeneration of a malpighian body, with a few granule cells.—(*Wedl.*) 300 *diam.*

bably it is some change in the chemical composition of the structure affected, which has yet to be determined (Cases CLXVII. and CLXVIII.)

3. *The Fatty Form.*—This, as we have seen, may be a result of the inflammation, but it is not unfrequently produced independent of it. Here, again, the progress of the disease is chronic, is not so frequently associated with scrofula and tubercle, but occurs rather in individuals more advanced in life, suffering from cardiac and bronchitic disorders, or who are addicted to intemperance. It is also frequently associated with fatty degeneration of the heart and liver. Dropsy and persistent albuminuria are constant symptoms, and the sediment is loaded with casts of the tubes containing oil granules (*fatty casts*) and granule cells.

On examining the kidneys of individuals who have died of this form of the disease, we observe the tubes more or less obstructed by fatty granules, which have gradually accumulated in the epithelial cells of the tubes. These separate, and even burst, liberating their contents, and in this way obstruct the tubes, and compress the secreting and surrounding textures (Fig. 414, *a* and *b*). Gradually the vessels are so compressed, that the organ affected looks bloodless, and though, on the whole, enlarged, is of a light fawn or dirty white colour. The fibrous texture is occasionally hypertrophied, causing contractions round the convoluted tubes, thus producing irregularities on the surface. Occasionally, also, large accumulations of the fatty granules take place, causing the tubes to burst, and presenting to the naked eye light fawn-coloured spots or granulations, more or less numerous, which are scattered over and through the cortical substance. It is easy to conceive how such accumulations of fat, and consequent pressure and obstruction, must at length so interfere with the kidneys,

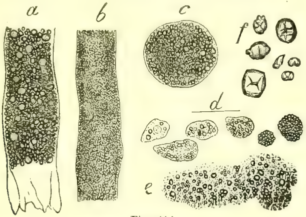

Fig. 414.

Fig. 414. Structures in a fatty kidney. *a* and *b*, Tubes filled with fatty granules, having in one of them the transparent basement membrane visible. *c*, Transverse section of a similar tube. *d*, Fatty epithelium of the tubes. *e*, Amorphous fatty matter in the tubes. *f*, Crystals of uric acid in a tubule. (*Wedl.*) 350 *diam.*

as to be incompatible with the performance of their functions (Case CLXIX.)

On scraping the surface of a fatty kidney, and adding a drop of water, we are enabled to see, under a magnifying power, fragments and cells such as are given Figs. 414, 415. They exhibit portions of uriniferous tubes loaded with free fat granules and epithelial cells, also containing similar fat granules. On making a thin section of a fatty kidney, we not unfrequently see the tubes *in situ* loaded with similar granules, and the fibrous tissue so increased and thickened between them as to occasion a lesion identical in many respects with the so-called cirrhosis of the liver, to which an atrophied and granular kidney is strictly analogous. Sections of the cortical substance of such kidneys are represented Figs. 416, 417.

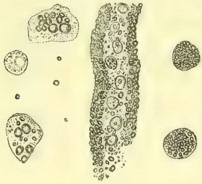
Fig. 415.

The above is a condensed description of what appears to me the three pathological forms of Bright's disease of the kidney. These lesions, although they are met with separately and distinct, may, however, be more or less conjoined. One part of a kidney may be congested or inflamed, whilst another is fatty; or we may have the fatty and waxy conditions united together. It is only in this way that we can account for the various shades of alteration which the kidney may at different times present during the continuance of persistent

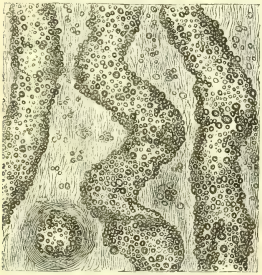
Fig. 416.

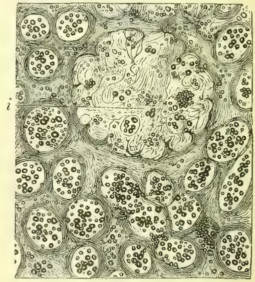

Fig. 417.

Fig. 415. Portion of fatty tube, with fatty epithelial cells, scraped from the surface of a fatty kidney.

Fig. 416. Longitudinal section of a fatty kidney, showing the tubes loaded with fatty granules.

Fig. 417. Transverse section to the former one, (*i*) malpighian body.—(*Christison.*) 250 *diam.*

albuminuria with dropsy. All these alterations, by interfering with the secreting functions of the cells, more or less impede the excretory power of the kidneys, and, if continued, ultimately tend to overload the blood with the effete elements which ought to be discharged with the urine. At the same time, by causing more or less congestion of the vessels, or by pressure on the malpighian bodies, and obstruction of the tubules, a serous effusion takes place, the albumen of which, passing into the urine, communicates to it that property of coagulability which constitutes its pathognomonic character.

Diagnosis of Bright's Disease.

The diagnosis of Bright's disease of the kidney is dependent on three kinds of observation:—1st, Symptoms; 2d, Chemical—and 3d, Microscopical examination of the urine.

1. *Diagnostic Symptoms.*—In the acute forms, pain in the lumbar region, high-coloured urine, and other indications of nephritis, followed by dropsy; and in the more chronic forms, the occurrence of dropsy, frequently without the local renal symptoms, are the chief diagnostic symptoms. But these symptoms would be always very vague until, by a chemical examination of the urine, the presence of albumen is determined.

Chemical Examination of the Urine.—In testing the urine, you should be careful to employ both heat and nitric acid. Heat alone, frequently separates earthy salts, which to the eye may resemble a slight cloud of albumen—and nitric acid alone, frequently throws down a precipitate of uric acid, where urate of ammonia is in excess. But if the coagulum produced by heat also resist the action of nitric acid, we may be pretty sure that the urine contains albumen. The mere presence of albumen in the urine does not constitute Bright's disease. It may accompany cystitis, or hæmaturia—may follow the action of a blister affecting the kidneys, or result from mercurialism, errors in diet, or confirmed dyspepsia. In all such cases, however, it is temporary, and does not present the diagnostic character of *persistence.*

Microscopical Examination of the Urine.—The method I have found best for determining the form and structure of the organic matters discharged in the urine, is to allow the fluid to repose for twelve hours, then pour off the supernatant liquid, and put the turbid sediment into a test-tube. Allow this to repose for another twelve hours, when the concentrated precipitate containing the organic matters collects at the bottom, which can now easily be brought into the field of the microscope. Or some ounces of the urine may be put into a conical glass, like an ale glass, and the precipitate allowed to deposit itself, as recommended by Dr. Johnson. From thence it can easily be obtained by pouring off the supernatant fluid, or by removing the sediment with a pipette for microscopic examination. The objects so brought into view are various, comprising different salts, cells, fungi, and casts of tubes (see pp. 91 to 94, and Figs. 71 to 78), the discrimination of which necessitates a knowledge of histology. The diagnostic elements, however, in Bright's disease, may be considered to be the separated casts of the tubuli uriniferi. These are of four kinds.

1. *Exudative Casts.*—These casts consist of the coagulated exudation or fibrin, which, in the inflammatory form, is poured into the tubes, so as to present a mould of their interior. They are analogous to similar casts which occur in the minute bronchi, in all cases of pneumonia, and are recognised under the microscope by their uniform molecular structure. They mostly occur in acute cases, are frequently associated with blood corpuscles, and not unfrequently with desquamative casts and epithelial cells. Figs. 77 *b* and 418 *d*.

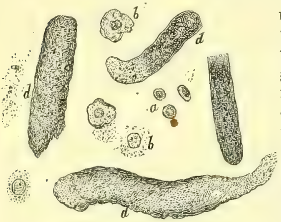

Fig. 418.

2. *Desquamative Casts.*—These casts consist of masses of the epithelium lining the tubules, sometimes closely aggregated together

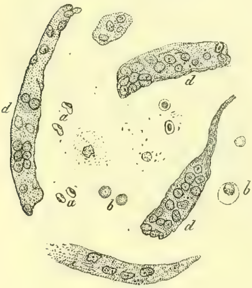

Fig. 419.

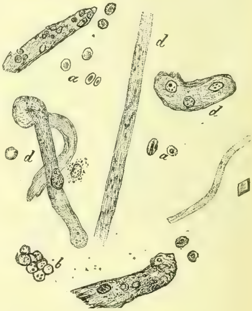

Fig. 420.

Fig. 418. Exudative casts (*d*), with epithelial or disintegrated cells (*b*), and blood corpuscles (*a*).

Fig. 419. Desquamative casts (*d*), with altered blood corpuscles (*a*), naked nuclei of cells (*b*).

Fig. 420. Desquamative casts, partly waxy (*d*), with blood corpuscles (*a*), and pus corpuscles (*b*). (*Christison*). 200 *diam.*

side by side, at others agglutinated by means of the molecular exudation, formerly alluded to. They result from a separation of the lining cell membrane from the interior of the tube, in patches of greater or less extent, and may be associated in acute cases with exudations, and in chronic cases with the fatty or waxy transformations next to be mentioned—(See Fig. 77, *a*, p. 93, and 419, *d.*)

3. *Fatty Casts.*—These casts consist of similar patches of epithelium as in the desquamative casts, which epithelium, however, has previously undergone the fatty transformation, by the accumulation of a greater or less number of fatty granules in its cells. Occasionally the cells burst and fill the tubes with fatty granules, among which no epithelium can be distinguished.—(See Fig. 78, p. 93, and Fig. 414). At others the cells are less changed, the fatty accumulation only, as it were, commencing as in Fig. 421. These fatty casts are often associated with fragments of desquamative ones, with few cells, more or less fatty, and frequently with the next kind of cast to be noticed. (Fig. 420).

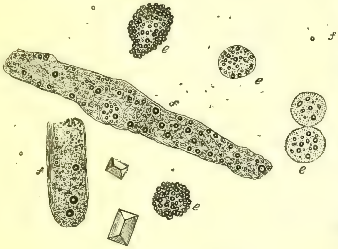

Fig. 421.

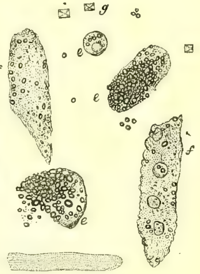

Fig. 422.

Waxy Casts.—These casts present an exceedingly diaphanous and structureless substance, which, according to Dr. Johnson, is secreted by the basement membrane after the destruction of its epithelial cells. But may it not consist of the basement membrane itself which has undergone some chemical transformation, the nature of which has yet to be ascertained? The waxy are frequently associated with the two kinds of casts last described, but especially with the fatty ones. (Figs. 420, 422). Not unfrequently all stages of transformation may be seen in the same demonstration, between a tube containing epithelial

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Fig. 421. Fatty casts, at an early period of formation (*f*), with granule cells (*e*), and crystals of triple-phosphate.

Fig. 422. Fragments of fatty and waxy casts. One of the latter is represented at the lower part of the figure. (*Christison.*) 200 *diam.*

cells, more or less fatty, a portion of which, however, being empty, presents the translucent or waxy appearance. (Figs. 414, 422).

The exact signification of all these various kinds of casts has yet to be fully determined by clinical investigation. But it appears to me that the exudative casts indicate the most acute form of lesion—the desquamative a sub-acute, the fatty a chronic lesion, and the waxy a lesion destructive of the tubular textures. But as all these different changes may be going on in the kidney at the same moment, so we may find these various casts mingled with one another in various proportions, combined with other structural elements. The predominance in number of one kind of cast over another, will, however, serve to indicate to the pathologist, with tolerable correctness, the nature of the change which is going on in the renal organs. They undergo great variety in size, often being much smaller than any kind of uriniferous tubes, a circumstance indicating considerable contraction of their calibers.

Treatment of Bright's Disease.

The acute forms of Bright's disease should be combated externally by cupping over the loins, and warm fomentations—internally by diaphoretics, and later by diuretics. I have seldom found it necessary to have recourse to general bleeding, and then only as a palliative to relieve pulmonary congestion. The chronic forms in addition to appropriate remedies require attention to diet and exercise. A non-fatty diet is evidently indicated in the fatty degeneration of the kidney. Exercise, change of air, and sea voyages are also beneficial. Care also should be taken that the surface be kept warm, and cutaneous transpiration favoured. The complications and sequelæ must be managed according to circumstances, and the general indications special to individual diseases. In this place I shall only allude to the effects of two classes of remedies, namely, diaphoretics and diuretics.

Diaphoretics.—The connection which necessarily exists between the kidneys and the skin as excretory organs, is well known. In health, impeded function in the one is, to a certain extent, compensated for by increased function in the other; and diseases in the skin, especially scarlatina, or other causes which tend to check cutaneous transpiration, are peculiarly liable to induce renal disorders. Such being the case, it seems highly judicious, in our efforts at cure, to excite by all means in our power, the functions of the skin in cases of Bright's disease of the kidney; and with this view, Dover's powder, keeping the surface warm, hot air baths, warm water baths, and a warm climate, are among the means which have been proved to be most useful. Should, however, as frequently happens, these remedies be of no avail, and the dropsical symptoms increase, then we must have recourse to the next class of remedies.

Diuretics.—It has been thought that in the acute inflammatory cases, where the kidney is more or less congested and loaded with exudation, that diuretics, by stimulating the organs and exciting them to increased action, would add to, rather than diminish, the excitement. But when it is considered that the dropsy is induced by obstruction in the secreting tubes, which presents a mechanical obstacle to the outward flow of fluid, it seems probable that, by increasing that flow, the accumulations producing the obstruction may be washed out. Besides, by augmenting the amount of fluid from the malpighian bodies through such tubes as still remain pervious, a compensation is frequently to be found for the diminished flow which takes place in the obstructed ones. Certain it is, that I have given diuretics in all stages of the disease with the best effects, as soon as it became manifest that the remedies formerly alluded to were of no avail. Nor have I ever seen any bad results from the practice. On this point I fully coincide with the observations made by Dr. Christison, in a most important lecture he has published on this subject.* Besides, in acute cases with diminution of urine and rapid dropsy, no other course is left open to us, as diaphoretics under such circumstances are seldom effectual.

The whole class of diuretics may be tried in Bright's diseases, in combination with other remedies; but the most valuable, so far as I have been able to determine, is the bitartrate of potass, which I have frequently seen to produce a most powerful effect, when every other had failed. The spongio-piline, saturated in a strong solution of infusion of digitalis, and digitaline, administered internally in minute doses, both recommended by Dr. Christison, are useful. But here again I have seen the cream of tartar operate after both these had failed. Sometimes also, after it has been given without effect at an early period of the disease, it has succeeded remarkably well at a later one. Of this, the case of Herdmann (Case CLXIII.) is a remarkable example, which warrants our having recourse to the remedy again and again after certain intervals, should it not act. It is very possible that the casts which obstruct the tubes may be more loosened at one time than at another, and that a powerful diuretic may, in consequence, have a greater effect in washing out the obstruction and restoring the function of the organs. At all events, I have rarely seen other diuretics succeed, when repeated attempts by means of the bitartrate of potass had failed.

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* Monthly Journal of Medical Science. June 1851.

SECTION IX.

DISEASES OF THE INTEGUMENTARY SYSTEM.

Notwithstanding the great advances which have been made in our knowledge of diseases of the skin, it cannot be denied that very inexact notions prevail regarding this class of disorders. I do not here allude to the eruptive fevers which, from their frequency and danger, necessarily demand the attention of every professional man, so much as to the lighter and more chronic disorders to which the skin is subject. Ignorance, however, here, although it seldom occasions danger to human life, produces great inconveniences, exasperates the progress of other maladies, renders life miserable, and frequently destroys those social relations and ties which constitute happiness.

A lady was seized with an eruption on the genital organs, which rendered the slightest contact unbearable. Her husband suspected that she laboured under syphilis, and accused her of infidelity. A medical man, who was consulted, pronounced her disease venereal—a separation took place between the parties; the lady always maintaining her innocence, but anxious to escape the unfounded suspicions and ill-treatment of her husband. Mercury and an anti-venereal treatment was continued for some time, but the disease increased in intensity. At length another physician, skilled in the diagnosis of skin diseases, was consulted, who pronounced it to be an *eczema rubrum*, quite unconnected with syphilis; and on the application of appropriate remedies, a speedy cure confirmed his diagnosis.

A lady in the country sent one of her servants into town, to obtain advice for an eruption which had broken out on her body, and which she was afraid might be communicated to her children. The practitioner consulted was much puzzled, and asked me to see the patient, who, according to him, was labouring under a rare form of skin disease. I found a *herpes zoster* extending round one half the trunk, and told him it would disappear spontaneously in a few days, which it did.

Nothing is more common in practice than to meet with cases among servants, where prurigo has been mistaken for itch, causing great alarm to the family, and much injury to the servant. The various diseases of the scalp also are continually confounded together. Indeed, examples might easily be accumulated, proving the inconvenience which an unacquaintance with skin diseases may occasion both to patient and practitioner. A young medical man is especially liable to be consulted in cases of trifling skin eruptions; and nothing is so likely to establish his credit, as the ready diagnosis and skilful management of such disorders, especially when (as frequently happens) they have been of long standing, and baffled the efforts of older practitioners. Conceiving, then, that this subject deserves more careful consideration than it usually meets with in a clinical course, I propose directing your attention to the classification, general diagnosis, and treatment of these disorders as an introduction to the study of individual cases in the wards.

CLASSIFICATION OF SKIN DISEASES.

Skin diseases are so various in appearance and in their nature, that many experienced practitioners have endeavoured to facilitate their study by arranging them in groups.

There are three kinds of classification which deserve notice :—1st, The artificial classification of Willan; 2d, The natural arrangement of Alibert; and 3d, A pathological arrangement founded on the supposed morbid lesions.

Of these, the best, and the one which most facilitates the study of cutaneous diseases, is certainly that of Willan. No doubt it has its faults and inconveniences, but many of them have been removed by Biett. This classification is founded upon the character presented by the eruption, which, when once known, determines the disease. It is an old saying, that it is much easier to play the critic and to find fault, than to construct something better. This remark may be well applied to those who have ventured to set aside the principle on which Willan's arrangement is founded, and to bring forward others. The natural classification of Alibert can never be followed by the student, and presupposes a considerable knowledge of the subject. The pathological arrangement again is decidedly faulty. The morbid anatomy and pathology of many skin diseases are unknown; how, then, can we found a classification upon them? Indeed, the very foundation on which such classifications are based, is continually undergoing changes as pathology advances.

On the whole, therefore, the arrangement best suited to the student and for practical purposes is that of Willan and Bateman, with the modifications subsequently to be noticed.

Definitions.—Before we can proceed to refer any particular disease to its appropriate class, we must be acquainted with the characteristic appearances which distinguish the different orders. They are as follows:—

1. *Exanthema* (Rash).—Variously formed, irregular-sized, superficial red patches, which disappear under pressure, and terminate in desquamation.

2. *Vesicula* (Vesicle).—A small, acuminated, or orbicular elevation of the cuticle, containing lymph, which, at first clear and colourless, becomes often opaque or pearl-coloured. It is succeeded either by scurf or a laminated scab.

3. *Bulla* (Bleb).—This differs from the vesicle in its size, a large portion of the cuticle being detached from the skin by the interposition of a watery fluid, usually transparent.

4. *Pustula* (Pustule).—A circumscribed elevation of the cuticle, containing pus. It is succeeded by an elevated scab, which may or may not be followed by a cicatrix.

5. *Papula* (Pimple).—A small, solid, acuminated elevation of the cuticle, in appearance an enlarged *papilla* of the skin, commonly terminating in scurf, and sometimes, though seldom, in slight ulceration of its summit.

6. *Squama* (Scale).—A lamina of morbid cuticle, hard, thickened, whitish, and opaque, covering either small papular red elevations, or larger deep-red, dry surfaces.

7. *Tubercula* (Tubercle).—A small hard, indolent, primary elevation of the skin, sometimes suppurating partially, sometimes ulcerating at its summit.

8. *Macula* (Spot).—A permanent discoloration of some portion of the skin, often with a change of its structure. These stains may be white or dark-coloured.

The different appearances thus described characterise the eight orders of Willan and Bateman, viz., 1. Exanthemata; 2. Vesiculæ; 3. Bullæ; 4. Pustulæ; 5. Papulæ; 6. Squamæ; 7. Tuberculæ; 8. Maculæ. The principal modifications made by Biett are removing from these groups certain diseases which have no affinity with them, and forming them into extra orders of themselves. Thus he makes altogether fifteen orders, as seen in the following classification given by his pupils Schedel and Cazenave, which also indicate the subdivisions into which each order is divided:—

Order I.—*Exanthemata.*
- Rubeola.
- Scarlatina.
- Erythema.
- Erysipelas.
- Roseola.
- Urticaria.

Order II.—*Vesiculæ.*
- Eczema.
- Herpes.
- Scabies.
- Miliaria.
- Varicella.

Order III.—*Bullæ.*
- Pemphigus.
- Rupia.

Order IV.—*Pustulæ.*
- Variola.
- Vaccinia.
- Ecthyma.
- Impetigo.
- Acne.
- Mentagra.
- Porrigo.
- Equinia.

Order V.—*Papulæ.*
  Lichen.
  Prurigo.
Order VI.—*Squamæ.*
  Psoriasis.
  Pityriasis.
  Ichthyosis.
Order VII.—*Tuberculæ.*
  Lepra Tuberculosa.
  Lupus.
  Molluscum.
  Frambœsia.
  Cheloidea.
Order VIII.—*Maculæ.*
  Lentigo.
  Ephelides.
  Nævi and Vitiligo.
Order IX.—*Purpura.*
  X.—*Pellagra.*
  XI.—*Radesyge.*
Order XII.—*Lepra Astrachanica.*
  XIII.—*The Aleppo Evil,* or *Malum Alepporum.*
  XIV.—*Elephantiasis Arabica.*
  XV.—*Syphilidæ* or *Syphilitic Eruptions.*

Even this classification is very complicated, and appears to me to admit of still further modifications, which will render the subject more simple and practical at the bed-side. I shall point out to you, in the first instance, the reasons which have induced me to make these modifications, and then give, in a tabular form, the classification which we shall in future adopt.

In the orders *Exanthemata* and *Pustulæ*, we find several diseases which are characterised by excessive fever, so that they have long been spoken of under the term of eruptive fevers, as well as under that of febrile eruptions. With them, in short, fever is the characteristic, and they are influenced by laws of a peculiar character, altogether different from those which regulate the production of other cutaneous affections. I propose, then, to remove these disorders from the category of skin diseases altogether, and to leave only three in the first order, namely, erythema, roseola, and urticaria. I am aware that, strictly speaking, these may be accompanied by slight fever, which may also occur in several other skin diseases. But I do not pretend to form a classification which is perfect, or even pathological, but one which some experience in the teaching of these diseases has convinced me is useful and practical for the student.

In the order *Vesiculæ* we find five diseases. I propose cutting out miliaria, as being very unimportant, and a trifling sequela of fevers. Varicella I believe to be a modified small-pox, and I omit it for the same reasons as I do variola. Scabies, on the other hand, though dependent upon the presence of an insect, the *Acarus Scabiei*, presents such distinct characters as to warrant its retention.

I propose expunging the order *Bullæ* altogether. We find in it two diseases. The first of these, pemphigus or pompholyx, is a vesicular disease in every point, appearing sometimes in successive crops, and forming a laminated scab. Rupia, on the other hand, is evidently a pustular disease, forming a prominent scab, producing ulceration, and leaving a cicatrix. I shall therefore add pemphigus to the order vesiculæ, and rupia to that of the pustulæ.

From the *Pustulæ*, for the reasons formerly stated, I expunge variola, vaccinia, and equinia. Mentagra, so far as I have been able to study it in this country, has always consisted of eczema or impetigo on the chin of the male. In syphilitic cases it is more or less tubercular, and it has been described also as consisting of a vegetable parasite. Although I have never seen the appearance figured by Cazenave (Plate 16), I can understand that such a mentagra might really consist of vegetable fungi. At all events, mentagra is not a special pustular disease. Porrigo means any eruption on the head, whether vesicular, pustular, or squamous. Favus, to which it has long been applied, is undoubtedly a vegetable parasite, and ought, with others of a like nature, to constitute a distinct class. Moreover, it is neither vesicular nor pustular. Hence the class of pustulæ will with us contain only impetigo, ecthyma, acne, and rupia.

The orders *Papulæ* and *Squamæ* remain the same. The strophulus of many English writers is certainly only lichen occurring in the child; and what has been called lepra, as distinguished from psoriasis, is the latter disease presenting an annular form.

From the class *Tuberculæ* I cut out frambœsia, as being a disease unknown in this country, together with cheloidea, which, as I understand it, means either cancer or tubercle of the skin.

As regards the order *Maculæ*, I place in it, as did Willan, purpura, because, although sometimes it may depend on constitutional causes of an obscure nature, and at others be allied to scurvy, it still, in an arbitrary classification of this kind, constitutes an undoubted spot or macula.

All the other orders of Biett I shall take the liberty of expunging—pellagra, lepra Astrachanica, and malum Alepporum, are unknown in this country. I agree with Hebra in thinking that Radesyge is only a modified form of lupus. The elephantiasis Arabica is an hypertrophy of the areolar tissue or chorion, and belongs more to the subject of fibrous growths than that of skin diseases. Syphilitic diseases I do not regard as a distinct order, but as any of the ordinary skin affections, more or less modified by a peculiar state of the constitution.

Whilst I have cut out many diseases from the eight orders originally established by Willan, and subsequently modified by Biett, I find it necessary to add two orders, which the advance of pathology and histology shows ought to be considered apart. I allude to those which depend on the presence of parasitic animals and plants, and which may be called respectively *Dermatozoa* and *Dermatophyta.* It has now been shown by M. Bourguignon, that scabies is dependent on the presence of an acarus, but that the insect is only indirectly the cause of the eruption. Hence I put acarus among the dermatozoa, although it certainly forms, when present, a constituent of itch. Among the dermatophytes will be placed favus and mentagra,—both removed from the class pustulæ. Other diseases, such as plica Polonica, and pityriasis, have been considered as parasitic, but the former is unknown in this country, and the latter, when it presents epiphytes among the scales, constitutes a form of favus.

The classification, then, we shall in future adopt is as follows:—

- Order I.—*Exanthemata.*
  - Erythema.
  - Roseola.
  - Urticaria.
- Order II.—*Vesiculæ.*
  - Eczema.
  - Herpes.
  - Scabies.
  - Pemphigus.
- Order III.—*Pustulæ.*
  - Impetigo.
  - Ecthyma.
  - Acne.
  - Rupia.
- Order IV.—*Papulæ.*
  - Lichen.
  - Prurigo.
- Order V.—*Squamæ.*
  - Psoriasis.
  - Pityriasis.
  - Ichthyosis.
- Order VI.—*Tuberculæ.*
  - Lepra Tuberculosa.
  - Lupus.
  - Molluscum.
- Order VII.—*Maculæ.*
  - Lentigo.
  - Ephelides.
  - Nævi.
  - Purpura.
- Order VIII.—*Dermatozoa.*
  - Entozoon folliculorum.
  - Acarus.
  - Pediculus.
- Order IX.—*Dermatophytæ.*
  - Achorion Schönleini (Favus).
  - Achorion Grubii (Mentagra).*

DIAGNOSIS OF SKIN DISEASES.

The recognition of skin diseases, and the separating one class from another, is of essential importance to a proper treatment. On this point I fully agree with a writer, who says, "The treatment of a great many cutaneous diseases is but of secondary importance, compared with their differential diagnosis. Many of them will get well without any treatment, provided they are allowed to pursue their natural course; and, on the contrary, a mild and simple eruption by being mistaken, from a similarity of external appearances, for one of a severe or rebellious character, and treated accordingly, may be aggravated and prolonged for an indefinite period." (Burgess.) This differential diagnosis, however, to the inexperienced, is a matter of great difficulty, because considerable tact is often necessary, not only to discover the original element each disease presents, such as a rash, vesicle, pustule, scale, and so on; but this is often impossible. Under such circumstances the diagnosis is frequently derived from the scab, or other appearances presented, such as the cicatrix. The whole subject has been rendered very confused and complicated by systematic writers, who have often given different names to the same disease, or unnecessarily divided them into forms and varieties. I advise you not to pay any attention to these forms and varieties for the present, and to confine your efforts only to the detection of the diseases enumerated in the table under each order; and with a view of facilitating your endeavours, the following short diagnostic characters and definitions should be attended to.

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* It has been objected to the words porrigophyte and mentagraphyte, introduced by Gruby, that they are unclassical; and as the celebrated botanist Link, after carefully examining these vegetations, has described the former as a new genus, under the head of Achorion (from *achor*, the old term given to a favus crust by Willan), I have thought it best to adopt that term. To mark the variety in favus, he has added the name of its discoverer, Schönlein; and I have ventured, at all events provisionally, to distinguish the one described as existing in mentagra, by adding to it also, that of its discoverer, Gruby.

I. EXANTHEMATA.

1. *Erythema.*—A slight continuous redness of the skin in patches of various shapes and sizes.

2. *Roseola.*—Circumscribed rose-red patches, of a circular, serrated, or annular form.

3. *Urticaria.*—Prominent red patches of irregular form, the centre of which is often paler than the surrounding skin.

II. VESICULÆ.

Eczema.—Very minute vesicles in patches, presenting a shining appearance, yielding a fluid which dries into a laminated or furfuraceous crust. The skin is of a bright red colour.

Herpes.—Clusters of vesicles, varying in size from a millet seed to that of a pea, surrounded by a bright red areola. They yield a fluid which dries into a thin incrustation, that drops off between the eighth and fifteenth day.

Scabies.—Isolated vesicles of an acuminated form, commonly seated between the fingers and flexor surfaces of the arms and abdomen—never on the face.

Pemphigus.—Large vesicles or blebs (bullæ), surrounded by an erythematous circle, the fluid of which forms, when dry, a laminated crust. When chronic, they appear in successive crops, and the disease is called pompholyx.

III. PUSTULÆ.

Impetigo.—Small pustules, commonly occurring in groups, and forming an elevated crust.

Ecthyma.—Large isolated pustules, depressed or umbilicated in the centre, and leaving a cicatrix.

Acne.—Isolated pustules situated on a hardened base, which form and disappear slowly. They only occur on the face and shoulders.

Rupia.—Large pustules, followed by thick prominent crusts, and producing ulcerations of various depths.

IV. PAPULÆ.

Lichen.—Minute papulæ occurring in clusters or patches.

Prurigo.—Larger and isolated papulæ generally seated on the extensor surfaces of the body.

V. SQUAMÆ.

Psoriasis.—Whitish laminated scales slightly raised above the reddened surface of the skin. Lepra is psoriasis occurring in rings.

Pityriasis.—Very minute scales, like those of bran, seated on a reddened surface.

Ichthyosis.—Induration of the epidermis, and formation of square or angular prominences, not seated on a reddened surface.

VI. TUBERCULÆ.

Lepra Tuberculosa.—(Elephantiasis of the Greeks.)—Tubercles varying in size, preceded by erythema and increased sensibility of the skin, and followed by ulceration of their summits.

Lupus.—Induration or tubercular swelling of the skin, which may or may not ulcerate. In the former case, ulceration may occur at the summit or at the base of the tubercles, and frequently extends in the form of a circle more or less complete.

Molluscum.—Pedunculated, globular, or flattish tubercles, accompanied by no erythema or increased sensibility, occurring in groups. They are filled with atheromatous matter.

VII. MACULÆ.

Lentigo or Freckle.—Brownish-yellow or fawn-coloured spots on the face, bosom, hands, or neck.

Ephelis.—Large patches of a yellowish-brown colour, accompanied by slight desquamation of the cuticle.

Nævi or Moles.—Spots of various colours and forms, sometimes elevated above the skin. They are congenital.

Purpura.—Red or claret-coloured spots or patches, which do not disappear under pressure of the finger.

VIII. DERMATOZOA.

These minute animals require a lens of considerable power to ascertain their characters, which need not be particularised here, as they will be subsequently described and figured. (See p. 784, *et seq.*)

IX. DERMATOPHYTÆ.

These minute plants require a high magnifying power to distinguish them with exactitude. But they communicate peculiar characters to certain cutaneous diseases, as follows :—

Favus.—Bright yellow, umbilicated crusts, surrounding individual hairs, which agglomerate together to form an elevated friable crust, of a peculiar musty or mousey smell.

Mentagra.—Grayish or yellowish dry crusts, of irregular form, originating in the hair follicles of the beard.

In forming your diagnosis, therefore, you will be guided principally by three characters:—1st, The primitive and essential appearance—that is, whether a rash, vesicle, pustule, and so on. 2d, The crust,—whether laminated or prominent, composed of epidermis only, etc. 3d, Ulceration,—whether present or absent; and if so, the kind of cicatrix. These and other characters I shall point out at the bed-side, so as to familiarise you with their appearances.

You will remember that the classification formed by Willan is wholly artificial. It is like the Linnæan classification of plants. The difficulty for the learner is to recognize the essential character, the more so as many diseases pass through various stages before this is formed. Thus herpes presents, 1st, a rash; 2d, papules; 3d, vesicles; 4th, pustules; yet the disease is considered vesicular. Ecthyma passes through the same stages, yet it is considered pustular. In the vesicular disease, however, the crust is laminated,—in the pustular, it is more or less prominent.

Again, it not unfrequently happens that two or more diseases are combined together in one eruption. Thus it is very common to meet eczema and impetigo combined, when the disease is called *Eczema impetiginodes.* Favus occasionally causes considerable irritation, producing a pustular or impetiginous margin around it. The vesicles of scabies are often accompanied by the pustules of ecthyma, and so on.

In very chronic skin diseases, it may happen that it is impossible to say what the original disorder was, whether vesicular, pustular, scaly, or papular. In such cases the skin assumes a red colour, the dermis is thickened, the epidermis rough and indurated, and a morbid state is occasioned, in which all trace of the original disease is lost, and what remains is a condition common to various disorders.

As regards varieties, little need be said, and as formerly stated, I advise you to postpone their study until you are acquainted with the diseases themselves. Even then an acquaintance with them is of secondary importance. These varieties have been formed on account of the most varied circumstances, such as,—1st, DURATION, most of them may be *acute* or *chronic;* 2d, OBSTINACY, hence the terms *fugax*, *inveterata*, *agrius*, etc.; 3d, INTENSITY, hence the terms *mitis*, *maligna*, etc.; 4th, SITUATION, hence the terms *capitis*, *facialis*, *labialis*, *palmaris*, etc.; 5th, FORM, hence the terms *circinatus*, *scutulata*, *iris*, *gyrata*, *larvalis*, *figurata*, *tuberosa*, *guttata*, etc.; 6th, CONSTITUTION, hence the terms *cachectica*, *scorbutica*, *syphilitica*, etc.; 7th, AGE, hence the terms, *infantilis*, *senilis*, etc.; 8th, COLOUR, hence the terms *album*, *nigrum*, *rubrum*, *versicolor*, etc.; 9th, DENSITY, hence the terms *sparsa*, *diffusa*, *concentricus*, etc.; 10th, FEEL, hence the terms *læve*, *indurata ;* 11th, SENSATION PRODUCED, hence the terms *formicans*, *pruritus*, *urticans*, etc.; 12th, GEOGRAPHICAL DISTRIBUTION, hence the terms *tropicus*, *Ægyptiana*, *Norwegiana*, etc.

Porrigo.

There was a period in the history of skin diseases when they were arranged in two great divisions, viz., those affecting the scalp, and those affecting the rest of the cutaneous surface. All the disorders comprehended in the first of these divisions received the name of Porrigo, a word said by some to be derived from *porrum*, on account of the scales or concretions of the scalp resembling the layers of an onion; by others it is derived from *porrigo*, to spread. Willan described six kinds of Porrigo, viz., *P. larvalis*, *P. furfurans*, *P. scutulata*, *P. favosa*, *P. lupinosa*, and *P. decalvans*. It is now ascertained that none of these diseases are necessarily peculiar to the scalp,—and that, although they are more or less modified by being connected with and affecting the hairs of that region, they may also occur on other parts of the skin. There can be little doubt, however, that the employment of the term Porrigo, as well as the corresponding word *Teigne* in France, has thrown great confusion over the subject of eruptions on the scalp. But, as this term is still in pretty general use, it will be well to explain to you what diseases these different kinds of Porrigo really are.

Porrigo larvalis (*larva*, a mask) is really Impetigo, or Eczema impetiginodes, of the scalp. The former is recognised by crusts more or less prominent or nodulated; the latter, by the circumstance that, in addition to these nodules, there is between them a laminated or brittle crust, spread more or less equally over the surface. They are both very common in infants and children; and as the disease sometimes extends over the face, concealing the features, hence the term larvalis. A very characteristic representation of Impetigo capitis, is given in *Willan* and *Bateman*, Plate xli., erroneously called Porrigo favosa. (See also the disease on the face, ibid, Plate xxxvii. *Alibert*, Planches 13 and 15.)

Porrigo furfurans (*furfur*, bran) is really Pityriasis of the scalp, although Psoriasis of that region has also received the same appellation. There is also a peculiar form of Eczema, or Eczema impetiginodes, in which the crust is friable, and breaks up, or crumbles into minute fragments, to which the term furfurans has been erroneously applied. The true Porrigo furfurans (Pityriasis) is well represented.—*Willan* and *Bateman*, Plate xxxviii. *Alibert*, Planches 14 and 15. It is often a form of favus. (See Favus.)

Porrigo scutulata (*scutulum*, a small shield).—The nature of this disease has been much disputed. By some, it is said to be Favus (Erasmus Wilson), by others a form of Herpes (Cazenave). The disease is described by Willan and Bateman, and more recently by Burgess, as consisting of oval or rounded, slightly elevated patches, covered with furfur, and having stunted or filamentous hair projecting from the surface. It is a form of skin eruption exceedingly rare in Edinburgh. It seems to be represented, *Willan* and *Bateman*, Plate xxxix. *Willis* (Trichosis scutulata).

Porrigo favosa (*favus*, a honeycomb) is a disease, the true nature of which has been only lately determined. It consists essentially of an exudation on the skin, in which fungi or phytaceous plants grow. Round, isolated, bright yellow crusts are formed, which, when compressed together, assume an hexagonal shape—hence the term *favosa.* It is well represented, *Willis* (Trichosis lupinosa). *Erasmus Wilson*, Fasciculus I. *Alibert*, Planche 17.

Porrigo lupinosa (*lupinum*, the lupine).—This is the same disease as the last. The round or oval crusts when isolated, and at an early stage, present a concavity and form, resembling that of the lupine seed —hence its name.

Porrigo decalvans (*calvus*, bald).—Baldness is so common among the aged, that it can scarcely be called a disease ; but when it occurs in young persons, and is circumscribed, it constitutes the Porrigo decalvans of Willan. It is said by Gruby to depend on a vegetable parasite growing in the hair. It is well represented, *Willan* and *Bateman*, Plate xl. *Willis* (Trichosis decalvans).

From this analysis of the different kinds of the so-called Porrigo, you observe that there is nothing peculiar with regard to them. With the exception of baldness, none essentially belong to the hairy scalp. True favus is far more common on the head than elsewhere ; but I have frequently seen it on various parts of the cutaneous surface, and occasionally on the cheeks or shoulders, without being on the scalp at all. It follows that instead of the term Porrigo, you should designate the disease as Eczema, Impetigo, Pityriasis, Psoriasis, or Favus of the scalp, as the case may be.

Notwithstanding I have endeavoured to place this subject before you in as simple and uncomplicated a form as possible, I am conscious that at first you will still experience considerable difficulty in the diagnosis of skin affections. This can only be removed by practical experience at the bed-side, and by constantly exercising your powers of observation in detecting the essential elements which their varied forms present. At the same time, I think the modified classification and short characters I have given, will materially assist your studies in this important department of practical medicine. It must be remembered, however, that they only refer to those cutaneous diseases which you are liable to meet with in this country. Should you ever be called upon to practise in the tropics, or in other places where peculiar skin disorders prevail, it will, of course, be your duty to study them in an especial manner. Here, as they cannot be made the subject of clinical observation, they are altogether removed from our consideration.

THE TREATMENT OF SKIN DISEASES.

Since the addition of a ward for skin diseases to the clinical department of the Royal Infirmary, I have had ample opportunities of determining what are the more common forms of cutaneous eruption met with in Edinburgh, and of trying various kinds of remedies. As the illustration of so many forms of integumentary disease by reports of cases is in this work impossible, I propose now to give a condensed account of the treatment I have found most successful.

EXANTHEMATA.

Few cases labouring under erythema, roseola, or urticaria enter the Infirmary, and in such as occasionally present these eruptions during their residence there, the mildest remedies suffice for their removal. In the severer cases, a saturnine lotion to diminish local irritation, with a saline purgative, generally suffices for the cure.

VESICULÆ.

Eczema is by far the most common disease met with, both in its acute and chronic forms. The local treatment I have found most efficacious is that which I first recommended in 1849.* It consists in keeping the affected part moist, with lint or linen saturated in a very weak alkaline solution, consisting of ʒss of the common carbonate of soda dissolved in a pint of water. For this purpose it is necessary to cover the moistened lint with oil silk, or gutta percha sheeting, which should well overlap the lint below, so as to prevent evaporation. The usual effect is soon to remove all local irritation, and especially the itching or smarting so distressing to the patient. It also keeps the surface clean, and prevents the accumulation of those scabs and crusts, which in themselves often tend to keep up the disease. After a time, even the indurated parts begin to soften, the margins of the eruption lose their fiery red colour, and merge into that of the healthy skin, and, finally, the whole surface assumes its normal character.

In private practice, it is often a matter of great difficulty to secure a proper application of the lotion. Individuals are slow to accept the idea that constant moisture of the part is absolutely necessary for the treatment, and hence vigilant superintendence and frequent visits are requisite, in order to watch the progress of the case. Even in the hospital constant care is necessary, to see that nurses properly cover the eruption ; and when, as sometimes happens, this task is given to the patients themselves, it almost always fails. Then there are some portions of the surface which it is very difficult to keep moist and well covered, such as the face and axillæ. But, by carefully adapting lint and gutta percha sheeting, attaching strings to the edges of the latter, so as to keep the whole in its place, I have never failed in ultimately carrying out my object. In the Infirmary I treat vesicular eruptions of the face in this way by means of a mask, having apertures for the eyes, nostrils, and mouth. If the eruption be very general, long soaking in slightly alkaline baths is useful.

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* Monthly Journal of Medical Science, August 1849.

In addition to stating what I have found to be beneficial, it is important to say what I have, on careful trial, ascertained to be useless or injurious. Perhaps no remedy is more generally employed in this and a variety of other skin diseases than citrine ointment, an application that I have always found to irritate and make eczematous eruptions worse. At the same time, there are some very chronic forms of the disease, which I have been told are cured by this preparation, but what these are I have never been able to ascertain. Indeed, all greasy applications whatever, in acute cases, are useless, and the patients themselves say, are very "heating." I have tried the freezing process recommended by Dr. Arnott, but the salt of the frigorific mixture, and the cold itself, has caused apparently so much agony, that I have been deterred from using it, especially when the emollient moist alkaline application is so efficacious.

In some rebellious chronic cases I have occasionally found the oil of cade a useful remedy, and in others the oxide of zinc ointment. They are most beneficial after a prolonged use of the moist alkaline application. In the same way, friction with the hand or a soft flesh brush favours the disappearance of the chronic induration and vascularity of chronic eczema of the inferior extremities, which should be kept as much as possible in the recumbent position. These stimulating applications, whilst useful in the very chronic and non-irritative forms of the disease, or to remove what an emollient treatment fails to accomplish, are most injurious in the acute forms.

Herpes.—This disease generally runs its course in about fourteen days, and requires no treatment whatever, further than an acetate of lead lotion to allay the smarting. It is not very common.

Scabies occurs very frequently, and is cured by a host of remedies. A strong lather, made of common soft soap and warm water, twice a day, answers very well. The question with scabies, is not what remedy is useful, but which will cure it in the shortest period. The most extensive experience at St. Louis has shown, that the sulphur and alkaline, or Helmerinch's ointment, cures itch, on an average, in seven days. That sulphur, however, is not the active remedy, I have satisfied myself by experiment. Soft soap, as we have seen, which contains alkali, and even simple lard, if pains be taken to keep the parts constantly covered with it, will cure the disease as soon as sulphur ointment. I have tried the Stavesacre ointment, recommended by M. Bourguignon, in only a few cases, but found it to answer very well. Its superiority, however, over other applications, I am not yet prepared to admit. (See Dermatozoa.)

Pemphigus.—This is rather a rare disease, and when chronic, coming out in successive crops, is very rebellious. I have cured several acute, and some tolerably chronic cases in from one to three weeks, by the weak alkaline wash, applied as in the case of eczema, combined with generous diet.

PUSTULÆ.

Impetigo.—This affection in all its forms is very common, and is best treated by the weak alkaline wash, exactly the same as in eczema. In the chronic forms which attack the chin of men, constituting one of the varieties of mentagra, the same treatment cures the most rebellious cases, if the moisture be constantly preserved. For this purpose the hair must be cautiously cut short with sharp scissors, and the razor carefully avoided. If the side of the cheek covered by the whisker be attacked, removal of the hair from thence also is essential to the treatment. A bag or covering accurately adapted to the part affected must be made of gutta percha sheeting, and tied on with strings. This may be covered with a piece of black silk, to allow the individual to go about and carry on his usual occupations. In this way I have frequently seen chronic impetigo of the chin, of from eight to ten years, standing, which has resisted all kinds of ointments and heroic remedies, completely removed in a few weeks. But then the surface must be kept *constantly* moist, a circumstance requiring great care and determination on the part of the patient. When it becomes necessary to shave, flour and warm water, or paste, should be used, and not soap. Alkalies applied from time to time only, as in the form of wash or soap, always irritate, although, when employed continuously, they are soothing.

Ecthyma is not a common disease, and usually presents itself conjoined with Eczema or Impetigo, and is treated successfully in the same manner as those diseases. The *E. cachecticum* requires, in addition to the alkaline wash locally, a generous diet.

Acne is a disease always requiring constitutional rather than local remedies. Although not uncommon in private, it is rare in hospital practice. Careful regulation of the diet, abstinence from wine and stimulating articles of food, watering-places, baths, etc. etc., constitute the appropriate treatment.

Rupia.—This disease I have never seen occur but in individuals who have been subjected to the influence of mercurial poisoning. Hydriodate of potassium and tonic remedies, with careful avoidance of mercury in all its forms, is the general treatment I have found most successful. If the pustules be few in number, the scabs may be removed by poulticing, and the sores treated locally with water dressing or red wash. But if they are numerous, great caution should be exercised in exposing so many ulcerated surfaces, and it is better to let the crusts remain.

PAPULÆ.

Lichen and Prurigo.—In both these affections, constant inunction with lard is as beneficial as constant moisture in the eczematous and impetiginous disorders. In the prurigo of aged persons, the *Ung. Hyd. Precip. Alb.* is a useful application, although the disease is not unfrequently so rebellious as only to admit of palliation. The chronic papular diseases often constitute the despair of the physician.

SQUAMÆ.

Psoriasis, and that modification of it known as *lepra*, is a very common disease, and has been uniformly treated by me externally with pitch ointment. I have satisfied myself by careful trials that it is the pitch applied to the part that is the beneficial agent, as I have given pitch pills and infusion of pitch largely internally, without benefit. With the hope of obtaining a less disagreeable remedy, I have frequently tried creosote, and naphtha ointment, and washes, but also without benefit. Lastly, I have caused simple lard to be rubbed in for a lengthened time, but without doing the slightest good. The oil of cade is occasionally useful, especially in psoriasis of the scalp. Internally, I give five drops of Fowler's solution, and as many of the tr. cantharidis. It is rare that the internal treatment alone produces any effect on a case of psoriasis of any standing. If a case resists this conjoined external and internal treatment, I have always found it incurable. Some years ago I carefully treated a series of cases internally with Donovan's solution, without producing the slightest benefit.

True *Pityriasis* frequently disappears of itself. In chronic cases the treatment by pitch is useful, and sometimes the application of the Ung. Zinci Oxyd. or Ung. Hyd. Precip. Alb. The form of pityriasis that is dependent on a vegetable fungus is identical with favus. (See Favus.)

Ichthyosis.—I have treated several chronic cases of ichthyosis. But while in some cases the skin has become a little softer from a course of pitch treatment, no permanent cure was effected.

TUBERCULÆ.

Lupus is the only kind of tubercular skin disease I have seen in the skin ward of the Infirmary, and that is pretty common. It is a constitutional disorder, and must be treated by cod-liver oil, and all those remedies useful for scrofula, of which it is a local manifestation.

The external treatment is surgical, consisting of the occasional application of caustics, red lotion, water dressing, ointments, etc., according to the appearances of the sore. I agree with Hebra in thinking lupus and the radesyze of the Norwegians to be the same disease. Many years ago I found lupus of the legs and thighs to exist among the fisherwomen of Newhaven, who assist their husbands in hauling in their boats, or who were accustomed to wade for any length of time in salt water.

MACULÆ.

Lentigo I have never found to be benefited by any kind of treatment, local or general. It is evidently connected with season and the intensity of the sun's rays, as it often disappears in winter and returns in summer.

Ephelis and Nævi are alike incurable. Bronzing from exposure to the sun, as in hot climates, frequently disappears on returning to a temperate latitude.

Purpura is a constitutional disorder, for the most part allied to scurvy. It consists of an alteration of the blood, with tendency to disintegration of the coloured corpuscles and diffusion of hæmatozine. Under such circumstances, ecchymoses occur in the skin, sometimes confined to round spots varying in size, at others existing in patches. It is for the most part associated with weakness, and requires rest and time to permit absorption of the extravasated blood, conjoined with tonics, anti-scorbutics, and generous diet. In sea scurvy, lemon juice and fresh vegetables are the true remedies.

Scalp diseases must be treated according as they depend on eczema, impetigo, psoriasis, or favus, in all cases first removing the crusts with poultices, then keeping the head shaved, and, lastly, applying alkaline washes, pitch ointment, or oil, according to the directions formerly given. Ringworm is a disease I have never seen in Edinburgh, and of what it consists I am ignorant. Some writers apparently consider it to be favus, and others a form of herpes. On two or three occasions I have seen a scaly disease of the scalp, in the form of a ring—that is lepra, which I have cured by pitch ointment, or oil of cade. Dr. Andrew Wood informed me some time ago, that he banished it from the Heriot's Hospital school of this city by condensing on the eruption the fumes of coarse brown paper, and thus causing an empyreumatic oil, or kind of tar to fall upon the part. This at one time led me to suppose that it might be a scaly disease, and a form of lepra or psoriasis. On the whole, I am inclined to think it a form of favus, which has commonly been mistaken for a scaly disease of the scalp. (See Favus.)

Syphilitic diseases of the skin are, in my opinion, the various disorders already alluded to, modified by occurring in individuals who have suffered for periods more or less long from the poisonous action of mercury. A longer time will be required for their cure, but the same remedies locally, conjoined with hydriodate of potassium in small doses, with bitter infusions, tonics, and a regulated diet, offer the best chance of success.

The great difficulty in the treatment of skin diseases, generally consists in their having been mismanaged in the early stages—a circumstance I attribute to the little care with which, until a recent period, clinical students have studied them. Many chronic cases of eczema are continually coming under my notice, which, in their acute forms, have been treated by citrine ointment, or other irritating applications, that almost invariably exasperate the disorder. I shall not easily forget the case of one gentleman, covered all over with acute eczema, who had suffered excessive torture from its having been mistaken for psoriasis, and rubbed for some time with pitch ointment. In the same way I have seen a simple herpes, which would have readily got well if left to itself, converted into an ulcerative sore by the use of mercurial ointment. Nothing is more common than to confound chronic eczemas of the scalp with favus, although the microscope furnishes us with the most exact means of diagnosis. I have seen one case in which a chronic eczema of the cheek was cut out by a surgeon, under the idea that the disease was malignant. I presume that acne must frequently have been mistaken for tubercular disease. In no other way can I account for some very distressing cases, where the patients' faces have been painted over with butter of antimony. I need scarcely say, that the correct application of the remedies I have spoken of can only be secured by an accurate discrimination, in the first instance, of the diseases to which they are applicable.

The general constitutional treatment in all these cases seldom demands aperient or lowering remedies except in young and robust individuals with febrile symptoms. In the great majority of cases, cod-liver oil, good diet, and tonics are required. In a few instances sedatives, both locally and internally, are necessary to overcome excessive itching or irritation. These the judicious practitioner will readily understand how to apply according to circumstances. Baths in all their various forms are useful in skin diseases, although, since I have applied a kind of constant local bath in the form of moist application, formerly alluded to (see Treatment of Eczema), they are comparatively seldom used by me in the Infirmary. The natural baths and mineral springs of watering places in Great Britain, France, and Germany are undoubtedly beneficial in appropriate chronic cases.

DERMATOZOA.

The skin may be attacked by certain animal parasites. Of these the pediculi, or lice, are too well known to need description. But we may shortly allude to the Acarus scabiei, and the Entozoon folliculorum.

Acarus Scabiei.

This insect has been proved by the researches of M. Bourguignon[*] to be the undoubted cause of itch. The male is about a third smaller than the female. He has suckers on two of his hind feet, and possesses on the abdominal surface genital organs, all of which characters are absent in the female. She, on the other hand, in addition to her size, and the negative marks alluded to, is characterised by the three kinds of horny spines which are scattered over the back. The suckers, or ambulacria, are organs of locomotion; the mandibles enable it to cut the epidermis, and extract fluid from the tissues, which passes through a delicate œsophagus, the internal termination of which is unknown, the body of the animal being apparently filled with an unorganised, very finely molecular pulp. A short delicate tube may also sometimes be observed at the anus—a supposed rectum. No respiratory apparatus can be discovered, although the creature may be seen to swallow minute bubbles of air, which pass down the œsophagus, and, like the nutritive juices, diffuse themselves

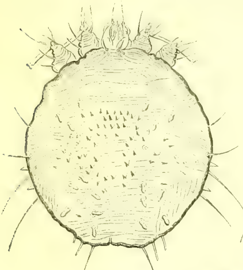

Fig. 423.

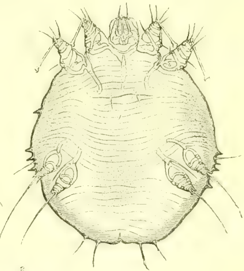

Fig. 424.

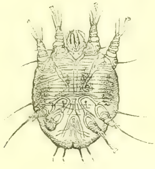

Fig. 425.

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[*] Traité entomologique et pathologique de la gale de l'homme. 4to. Paris, 1852.

Fig. 423. Dorsal surface of the female Acarus scabiei.

Fig. 424. Ventral surface of the same.

Fig. 425. Ventral surface of the male Acarus.—(*Bourguignon*). 100 *diam.*

through the interior. At all events, animal juice and air are both necessary to the life of the Acarus.

The disease called scabies has been conclusively shown by M. Bourguignon to be entirely owing to the presence of the insect, and to be communicated from one person to another, eight times out of ten, by their sleeping together. The female seldom quits her burrow but at night, and if impregnated, not even then, unless disturbed mechanically, as by scratching. Once in motion, she crawls over the surface with great rapidity, and readily passes from one person to another, where the skins are in contact. Communication is not readily occasioned by holding the hands of those affected, or by coming in contact with them during the day. The disease cannot be communicated by inoculating with the serum of the vesicles, by the pus of the pustules, or by any principle contained in the dead body of the insect itself. Neither can the Acarus of one species of animal, as of the horse or sheep, inhabit the body of a different one. Still the disease is not purely local, inasmuch as papular, vesicular, or pustular eruptions often occur in parts which the Acarus has not infested, so that they seem to originate from some cause independent of its mere presence.

The Acarus has a predilection for youth and a tender skin, and has a hatred of hair bulbs. Hence why it frequents young persons more commonly than old ones, and why in children it occurs indiscriminately all over the body, while in adults it is most often found between the fingers and toes, inside of the thighs and genital organs. Seventy times out of a hundred, scabies is confined to the hands, and in the other thirty, occurs also on the trunk and genitals. The only proof of the existence of itch, is the presence of the Acarus, and this is easily to be detected by a microscope adapted for the purpose by M. Bourguignon. It consists of a body with eye-piece and lenses magnifying seventy diameters linear, with a condensing lens, the whole placed on a movable arm with several joints, attached to a firm stand. With this instrument the entire surface of the body may be explored, and the movements and doings of the insects observed with the utmost facility. The associated papules, vesicles, and pustules are, in the opinion of M. Bourguignon, in no way diagnostic.

M. Biett made a series of experiments at the Hôpital St. Louis, to determine what substance would cure itch in the shortest space of time. He employed forty-one different applications and modes of treatment. The result was, that frictions with the following ointment occasioned recovery on the average in the smallest number of days:—Take of sublimed sulphur, two parts; of subcarbonate of potash, one part; and of lard, eight parts.

M. Albin Grass endeavoured to ascertain what substances would most quickly destroy the Acarus just removed from its burrow. It survived three hours in water; two in olive oil; one in a solution of acetate of lead; four-fifths of an hour in warm water; twenty minutes in vinegar and an alkaline solution; twelve minutes in a solution of sulphuret of potash; nine minutes in turpentine; and from four to six minutes in a solution of the hydriodate of potass. It survived sixteen hours in the vapour of sulphur under a watch glass; and one hour in the flowers of sulphur. According to these researches, therefore, hydriodate of potass would be the best remedy. He removed three living insects from a patient who had taken three sulphur baths, whereas, after a single application of Helmerich's ointment, that is, where sulphur and potass are combined, he frequently found them dead.

M. Bourguignon with his microscope watched with great care the effect of the frictions made at St. Louis with the sulphuro-alkaline ointment. After the first day, in which there had been two frictions and a simple bath, the Acari were in no way disturbed. In two days, after four frictions, they were still active, but burrowed deep in their grooves. In three days they still lived, but were unusually flat; but their eggs could be hatched by artificial heat, and produced larvæ, possessing great activity. In four days the insects in the superficial parts were shrivelled up and dead; the deeper ones, though living *très malades.* Many of the eggs now aborted. In five days all the insects were dead; and in six even the eggs had lost their vitality. The eruptions, on the other hand, often remained stationary, and not unfrequently became worse from the irritation of the ointment and frictions, but after a time they disappear also. Hence it is common at St. Louis, after seven or eight days' friction, to send out the patients though still covered with eruption, and in most cases they get well. About three in ten, however, return with the disease again established, a circumstance that M. B. attributes to the fact, that the frictions, which were only applied to the superior and inferior extremities, had not destroyed the insects which were present on the trunk.

M. Bourguignon, on considering the structure of these Acari, and the facility with which a poisonous fluid could penetrate their delicate integument, was led to make a series of observations to determine how long they would live after the application of various toxic solutions. He found those which possessed the most energetic action on these creatures were solutions of the ioduret of potassium and of the ioduret of sulphur, which killed them in eight minutes. A solution of the alcoholic extract of staphisagria was the next in virulence, destroying the animals in fifteen minutes. The hands of an itch patient were immersed in a solution of the two former for two hours, so as strongly to impregnate and colour the integuments. On examining the insects immediately afterwards, they were as lively as ever, but on the next day they were all dead, and the eggs destroyed. The epidermis was greatly shrivelled, and in three days complete desquamation occurred, carrying with it Acari, grooves, and eggs, and leaving the cutis raw and tender. The action on the skin was evidently too strong. A bath of a solution of the alcoholic extract of staphisagria was then made, and immediately after a two hours' immersion of the hands, all the insects were found dead, and, with one exception, the eggs destroyed. So far from irritating the integument, this application at once caused the itching to cease, and produced such calmative effects, that M. B. proposes it as a local remedy for inflammation. The eruptions also appeared to be rapidly cured by it. After various experiments, he adopted an ointment of the staphisagria as the most generally useful preparation, prepared as follows:—Recent grains of staphisagria in powder, 300 grammes; boiling lard, 500 grammes. Digest for 24 hours at the temperature of 100° in a sand bath, and strain. Four days of frictions with this ointment, instead of seven with sulphuro-alkaline ointment, not only destroys the insects and their eggs, but completely cures and prevents the integumentary irritation and eruptions.

Entozoon Folliculorum.

This insect inhabits the sebaceous follicles of the skin, and is very common in the face, more especially when the seat of acne. In the follicles of the nose they are present in the majority of living persons, and, according to Simon, are almost universal in dead bodies. He

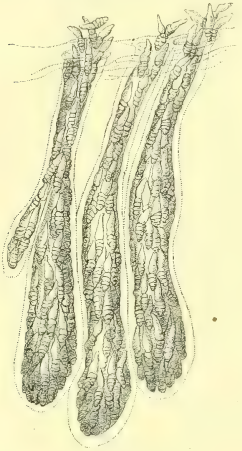

Fig. 426.

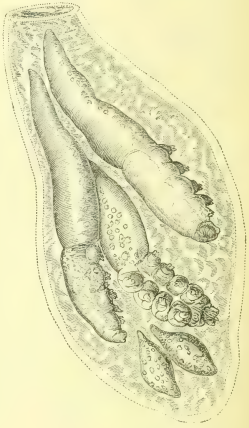

Fig. 427.

Fig. 426. Three follicles of the skin of the dog containing entozoa. 100 *diam.*

Fig. 427. Cul-de-sac of a sebaceous follicle, containing three animalcules in different positions, and two eggs—(*after Gruby*). 350 *diam.*

frequently found them living six days after the death of the individual in whom they were found. The animal measures from 1-135th to 1-64th of an inch in length, and from 1-155th to 1-555th of an inch in breadth. It is composed of a head, a thorax, and abdomen.

The *head* represents in form a truncated cone, flattened from above downwards, and directed obliquely downwards from the anterior part of the trunk. The existence of an eye has not been determined. The head is furnished with two maxillary palpi, which admit of extensive motion. The *thorax* is the broadest part of the animal, and is composed of four segments. In each of these, on each side, are two legs—eight in all. The *abdomen* varies in length, is annulated in structure, and admits of certain movements. Internally, Dr. Erasmus Wilson has traced out an alimentary canal, and its termination in an anus, together with a brownish mass which he considers to be the liver. No sexual differences have been discovered in them, and they possess no respiratory organs.

The animalcule is easily found by compressing with two fingers the skin we wish to examine, until the sebaceous matter is squeezed out, in the form of a little worm. This matter should be placed in a drop of oil previously heated, then separated with needles, and examined with a microscope magnifying 250 diameters. Their movements are slow, whilst the conformation of their articulations only permits them to move forwards and backwards, like lobsters. (Gruby.) They are nourished by the sebaceous secretion of the follicles.

They most commonly occupy the excretory duct of the follicles, which are often dilated in the places where they are lodged. Their head is always directed towards the base of the gland. When there are many together, they are placed back to back, and their feet are applied against the walls of the duct. When very numerous, they are compressed closely together, and are found deeper in the ducts. They rarely exist, however, at the base of the gland. In young persons they generally vary in number from

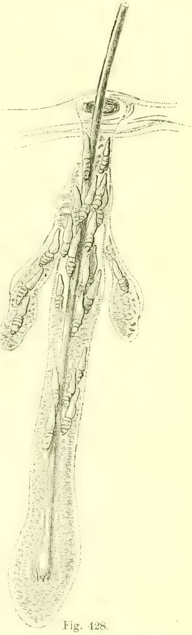

Fig. 428.

Fig. 428. Hair and its follicle, in which may be seen the animalcules descending towards the root of the hair, and cul-de-sac of the follicles.—(*Gruby.*) 100 *diam.*

two to four; in an aged individual, they may be from ten to twenty. (Gruby.)

Though this entozoon may occasionally be associated with acne, it seldom gives rise to great inconvenience. According to Erasmus Wilson, the difficulty seems to be not to find these creatures, but to find any individual, with the exception of newly born children, in whom they do not exist.

DERMATOPHYTA.

The growth of parasitic fungi on the surface of the skin, has now been observed under a variety of circumstances, and constitutes occasionally in man three forms of skin disease, which I believe to be essentially the same, viz.—tenia favosa, a certain form of pityriasis of the scalp, and of mentagra. The latter is very rare in this country; and I have never seen a case of it. All these disorders, however, may be classified under the head of favus, under which I shall consider them.

Favus.

Case CLXX.*—*Favus of the Scalp in an Adult—Incurable.*

History.—Isabella Fergusson, æt. 22, a somewhat stout servant girl, with fair skin, and scrofulous aspect, was admitted into the clinical ward of the Royal Infirmary, May 6, 1849. She states that there has been an eruption on her head for the last twelve years. Four months ago the catamenia ceased, since which time she has been subject to occasional headache, constipation, and slight dyspepsia.

Symptoms on Admission.—Nearly the whole of the scalp is covered with a thick yellow friable crust, of uneven surface, and irregular margin, emitting a highly offensive odour, like cat's urine, and causing great itching and irritation. Up to the middle of July she was treated with various internal remedies, which subdued the constipation and dyspepsia, and caused return of the catamenia. The crusts on the scalp were removed by poultices, and an ointment, composed of *ammon. mur.* ʒj; and *ung. sulphuris*, ʒj, applied locally. Dr. Bennett first took charge of the case on the 14th of June. The head was then again covered with favus crusts, some isolated, others compressed together, and forming an elevated scab. A small portion, examined under the microscope, presented the branches and sporules of the cryptogamic plant so characteristic of the disease. *The crusts were again removed by poultices of linseed meal, the head shaved, and cod-liver oil ordered to be applied to the scalp morning and evening,—the whole to be covered with an oil-silk cap.* This treatment was continued for six weeks, but on suspending it the favus crusts returned. During the months of August and September, iodine and pitch ointments were applied; portions of the scalp were even blistered, but without effect.

Progress of the Case.—At the commencement of October, the scalp being at the time perfectly clean and closely shaved, all local treatment was suspended, and the reappearance of the disease carefully watched. In three days the entire surface presented a scaly eruption, the epidermis being raised, cracked, and broken up over the whole scalp, which was exceedingly dry and harsh. The furfuraceous condition of the scalp continued, becoming more and more dense, until the fourteenth day, when there were first perceived minute bright sulphur-coloured spots in it. These, on being examined microscopically, were seen to be composed of fine molecular matter, mingled with epidermic scales, from which delicate branched tubes were apparently growing. The crusts were now once more removed by repeated poulticing, and cod-liver oil applied as formerly. The scalp continued free from eruption until the *20th of November*, when she was seized with febrile symptoms, which ushered in a very severe attack of typhus, that ran its usual course. She was not considered fully convalescent until the *8th of December*. During this period, no local application was made to the scalp, with the exception of the cold douche to alleviate the head symptoms, delirium and coma having been severe. The surface latterly once more became covered with furfuraceous scales; and on the *11th December* the bright yellow minute spots again made their appearance. As her strength improved, the favus crusts increased in size and number, and the progress of this very singular disease was again carefully watched. Each individual crust, at first the size of a small pin's head, gradually flattened out, and became circular. Its centre was cupped and umbilicated, and many, which were more isolated than the rest, grew until they measured a quarter of an inch in diameter. More generally, however, they came in contact with others, and groups of twos, or threes, and sometimes a dozen, became compressed together, and presented the hexagonal form of the honey-comb. Gradually the concavity disappeared. Each crust presented an external dark ring, and an internal lighter centre, which became considerably elevated. The various groups became aggregated together, and she complained of great itching and irritation, and it was evident that, if allowed to proceed further, the condition she presented on admission would be soon produced. The crusts were, therefore, again removed by poultices, cod-liver oil once more applied, and the scalp remained clean and free from irritation until *17th January*, when the cure appearing to be hopeless she was dismissed. She was enjoined to continue the use of the oil, which, whilst applied, and covered with the oil-silk cap, had the power of preventing the formation of fresh crusts on the scalp.

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* Reported by Mr. William Johnston, Clinical Clerk.

CASE CLXXI.*—*Favus of the Scalp of three years' standing—Cured.*

HISTORY.—Margaret Bryer, æt. 12, of scrofulous and cachectic appearance, was admitted June 19th, 1849, with favus crusts on the scalp. The crusts are most numerous and dense on the crown of the head; but others, isolated or in small groups, are scattered over the temples, forehead, and occiput. The scalp is bald, here and there in patches, varying in diameter from half an inch to an inch. On examining the crusts microscopically, they are seen to contain the cryptogamic branches and sporules pathognomonic of favus. The disease is of three years' standing, and is attributed to the use of a comb, belonging to another girl who had a sore head. The crusts have been several times removed by means of pitch plasters and a variety of ointments, but have always returned.

PROGRESS OF THE CASE.—At first, the crusts were removed, and the scalp kept moist by means of an alkaline lotion, which succeeded in removing the irritation. Early in July she was ordered ℥ss *of cod-liver oil three times a-day. The oil was also directed to be applied to the shaved scalp twice daily, which was to be kept con-*

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* Reported by Dr. J. Smith, Clinical Clerk.

stantly covered with an oil-silk cap. This treatment was persevered in until *August 10th*, when she was dismissed cured. This girl was re-admitted *September 5th*, and remained in the Infirmary five days, under observation. Up to this time the disease had not re-appeared, so that, when dismissed on the *10th*, a permanent cure was undoubtedly produced.

CASE CLXXII.*—*Favus caught in the Ward from Case* CLXX.—*Cured.*

HISTORY.—Margaret Cameron, æt. 5, an ill-nourished, cachectic-looking child—admitted July 23d, 1849, on account of an eruption on the scalp. In some places the hair was matted together by a recent pustular eruption ; groups of impetiginous pustules and eczematous vesicles being scattered here and there. In others, where the disease was more chronic, hard, nodulated, elevated masses, and friable crusts existed. The disease was eczema impetiginodes. No favus was present, as was proved by careful examination, and microscopic demonstrations of the scabs. *Poultices were ordered to the scalp, to remove the crusts ; and afterwards an alkaline wash, with cod-liver oil internally.*

PROGRESS OF THE CASE.—My colleagues taking charge of the ward during the months of August and September, I lost sight of this patient ; but, on resuming duty in the beginning of October, I was surprised to find the child's head covered with favus crusts, with the branches and sporules fully developed, as proved by the microscope. It appeared that the girl was a great favourite with Isabella Fergusson (Case CLXX.), and frequently slept in her bed, and there can be little doubt she had caught favus from her. The child's general health, however, had greatly improved ; and *the crusts were ordered to be removed by poultices, the head shaved, and cod-liver oil applied locally twice daily, and an oil-silk cap to be worn constantly.* This treatment was continued for seven weeks. At the end of that time all treatment was suspended, and the scalp watched daily. In fifteen days the head was covered with a slight furfuraceous desquamation ; but the hair was abundant. Another week elapsed without any return of favus ; and, her health being now good, she was discharged, *December 6th.*

CASE CLXXIII.†—*Favus of the Scalp of four years' standing, cured by a Sulphurous Acid Lotion.*

HISTORY.—Helen Goodall, æt. 15—admitted November 3d, 1853. She has been affected with favus of the scalp for four years, and frequently been in the Infirmary, and subjected to various kinds of treatment, under different physicians, without any permanent benefit. On admission a great portion of the scalp was bald, from destruction of the hair bulbs, but the other portions were covered with a prominent yellow friable crust, of mousy odour, crowded with pediculi. On the *7th of November* a lotion composed of one part of sulphurous acid and three parts of water, was constantly applied by means of lint saturated in it, and covered with an oil-skin cap. It was suspended *December 23d*, leaving the scalp partly bald, but quite clean. On the *15th of January* 1854 the disease had not returned. The scalp was then rubbed over with the oil of cade, twice daily, to remove the squamous eruption, and she was dismissed apparently quite cured, *February 5th.*

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[*] Reported by Mr. Alexander Struthers, Clinical Clerk.

[†] Reported by Mr. P. W. Wallace, Clinical Clerk.

CASE CLXXIV.*—*Limited Favus of the Cheek, cured by Cauterization with Nitrate of Silver.*

HISTORY.—James Scott, æt. 15, a painter, applied for advice, January 27, 1850. He states that, a week ago, without any known cause, he observed a small spot about the size of a pin's head, over the external angle of the left malar bone. On examination, a circular reddened spot, about the size of a shilling, is seen over the external angle of the left malar bone, in the centre of which were several favus crusts, aggregated together. These examined under the microscope, presented the branches and sporules pathognomonic of the disease. *The whole was then well cauterized with nitrate of silver*, and was cured at once.

Commentary.—Of the five cases of favus now given, the first was that of an adult, and was of twelve years' standing. By means of poultices and excluding the air with oily applications, the scalp could easily be freed from the eruption and kept so; but as soon as these means were discontinued, the disease returned. The second and third cases were permanently cured by the constant application of oil to the scalp for six or seven weeks. They were children of the ages of twelve and five years respectively. In the former the disease was of three years' standing; in the latter, it was altogether recent, and caught from another case in the ward. The fourth case was cured by using a sulphurous acid lotion instead of oil—a practice recommended by Dr. Jenner, in consequence of the powerful effect possessed by this acid, in destroying vegetable growths. In the fifth case, the disease was limited, and was at once destroyed by means of caustic. It is rare that favus can be watched through its entire progress in the wards of a hospital—first, because the disease commonly lasts months—often years, and charitable institutions cannot support individuals so long; and, secondly, because it always happens, that when urgent cases demand admission, and beds are required, these are just the parties who are discharged to make room for them. At the same time, the disease is so common in Edinburgh, that the wards are seldom free of one or more examples of it in various stages. Besides, by poulticing off the crusts, and allowing the eruption to come back, its commencement and progress may be studied in any individual case.

CASE CLXXV.†—*Parasitic Pityriasis—Incurable.*

HISTORY.—Charlotte Clerk, æt. 18—admitted June 20, 1857—a Hindoo girl from Bombay. She has had an eruption on her head ever since she can remember. On admission the hair clipped short, and the scalp was bald in patches, especially over the crown of the head. The hair is filled with scales, easily detached, resembling desquamated epidermis. Towards the back of the head these scales are embedded in a diffused friable yellowish matter, which, on examination under the microscope, presents the thalli and sporules of favus. *July 6th.*—To determine more certainly the character of the disease, poultices have been applied to the head, the hair shaved, and the disease allowed to return. To-day, being the seventh since the head was clean, two bright yellow favus spots, perforated by a hair, were observed. These rapidly increased and amalgamated with others, never forming distinct favus crusts, but causing a scaly eruption over the surface, together with a few pustules of impetigo. On removing the scales a friable yellow mass can be generally seen below, presenting on examination the vegetable structure of the Achorion Schoenleini. The sporules and thalli were unusually large and well developed. This girl was treated by constant oleaginous and other applications; was dismissed and re-entered the house; but when I last saw her in December 1857, the disease still existed as bad as ever.

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* Reported by Mr. Hugh Balfour, Clinical Clerk

† Reported by Mr. W. Guy, Clinical Clerk.

Commentary.—This eruption presented to the naked eye all the appearance of pityriasis of the scalp. The only suspicious circumstance was the baldness. I had previously seen two similar cases, and was in no way surprised to find that the disease was a parasitic one. All chronic scalp eruptions, especially if there be Alopæcia, should be examined microscopically, in order to arrive at an exact diagnosis. Essentially the fungus is the same as that of favus, although it may present occasional modifications as to the size of the sporules and thalli. In the present case they were remarkably well developed and larger than usual, in one case I found all the sporules perfectly globular, and only half the size of the usual oval corpuscles. In this, as in Case CLXX., all the remedies tried were of no avail.

History of Favus as a Vegetable Parasite.—(*Achorion Schoenleini of Link.*)

The demonstration by Bassi[*] of the vegetable nature of the disease named muscardine in silk worms, which causes so great a mortality amongst those animals, opened up to pathologists a new field for observation, and led to the discovery, that certain disorders in the higher animals, and even in man himself, were connected with the growth of parasitic plants of a low type. Schönlein,[†] of Berlin, was the first to detect them in favus crusts—an observation confirmed by Remak,[‡] Fuchs, and Langenbeck.[§] Gruby[||] gave a very perfect description of these vegetations in 1841, and made numerous researches as to their seat, origin, and mode of propagation. These were repeated by myself, and further extended in 1842.[¶] In 1845 I succeeded in inoculating the disease in the human subject. Since then they have been made the subject of further investigation by Lebert,[**] Remak,[††]

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[*] Del. Mal. del Segno Calcinaccio o Muscardino. Milano, 1837.

[†] Müller's Archives. 1836.

[‡] Medicinische Zeitung. 1840.

[§] Comptes Rendus de la Polyclinique de Göttingen.

[||] Comptes Rendus, tom. xiii. pp. 72 and 309. 1841.

[¶] On Parasitic Vegetable Structures found Growing in Living Animals. Edinburgh Philosophical Transactions, vol. xv. p. 277. 1842. Monthly Journal, June 1842.

[**] Physiologie Pathologique, tom. ii. 1845.

[††] Diagnostiche und Pathogenische Untersuchungen. 1845.

Robin,* and numerous other inquirers, to whose observations I shall have occasion to allude subsequently.

Mode of Development and Symptoms of Favus.

By most writers, amongst whom may be cited Willan, Bateman, Biett, and Rayer, favus is described as commencing in a pustule, which breaks and forms the peculiar scab. Others, such as Baudelocque, Alibert, and Gibert, deny its pustular nature, and state that it commences in a crust. But numerous observations have satisfied me that the formation of pustules is not essential to the disease, although they are often present. Hence the mistake of those pathologists who classified favus amongst the pustulæ. M. Gruby says that they are *never* present, which is equally erroneous, although they appear to be a secondary result, attributable to the irritation the disease produces in some individuals.† On the other hand, I have never seen this affection produced, without having been preceded by desquamation of the cuticle, an observation which appears to me of some importance in explaining the origin of the disease, as we shall subsequently see. Occasionally, also, the scales form a thick mass, and the favus matter is more disseminated, and does not form the distinct umbilicated crusts. This constitutes the parasitic pityriasis of some writers.

After removing the favus crusts by poulticing, and then watching from day to day how the disease returns, it will be seen that the first morbid change is increased vascularity of the skin, accompanied with a desquamation of the cuticle; and that in a period varying from twelve to fourteen days, small spots of a bright yellow colour, like that of sulphur, may be detected. These gradually augment in size, but even at the earliest period may be observed, with a lens, to have a central depression, through which a hair may generally be observed to pass. The crust or capsule may enlarge to about the size of a shilling, and if it be isolated, still retain its rounded form. Usually, however, its edges come in contact with other capsules, and then it loses its rounded shape, and assumes the hexagonal and honey-combed appearances described by authors. I consider, then, that the so-called Porrigo lupinosa, and Porrigo favosa, constituting distinct forms or varieties of some writers, are merely different stages of the same disease, and dependent upon the greater or less aggregation of the crusts. On the first appearance of the capsule, its edges are somewhat depressed below the surface of the cuticle; but as it increases in size, the margins become more and more elevated and prominent, whilst a series of concentric rings or grooves may be observed in them. At first, also, the whole capsule appears of a homogeneous bright yellow, but when further developed, its centre assumes a whiter colour. This arises from the aggregation of the sporules of the plant, which are more abundant in this situation. As the development proceeds, this central whitish yellow mass assumes a mealy, powdery consistence, and encroaches upon the edges of the capsule, which gradually disappear, whilst its upper concave form becomes convex, as Gruby pointed out. In general, an inflammatory ring is seen round the crust, which, as the capsule becomes elevated above the skin, enlarges, and assumes a deeper colour, indicative of the increased local irritation. At length the whole cracks or splits up; all regular form is lost; a dense thick crust covers the scalp; an odour, like the urine of cats or mice, is evolved; and in chronic cases, vermin deposit their eggs in the interstices, and crawl in large numbers over the surface.

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* Des Végétaux qui croissent sur l'Homme, etc. 1847.

† This explanation of the origin of pustules and purulent matter, when present, has been adopted by Lebert, Remak, and Simon.

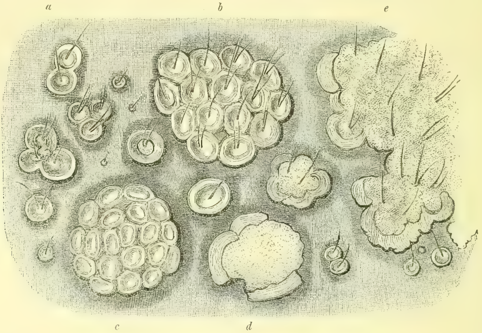

Fig. 429.

I have satisfied myself that occasionally the disease, instead of presenting distinct capsules round hair bulbs, becomes diffused under the epidermis, which then assumes the appearance of pityriasis, and not unfrequently of chronic eczema. A microscopic examination, however, will in such cases always detect groups of sporules and thalli more or less developed. In one instance I found the sporules smaller than usual, and perfectly globular instead of oval. In others I have seen the sporules three or four times larger than those of ordinary favus, with included nuclei, multiplying fissiparously. Hence the so-called para-

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Fig. 429. *a*, Isolated crusts of Favus, presenting the lupine seed-like depression in different stages of growth (so-called *Porrigo lupinosa*); some are arranged in groups of twos and threes. *b*, A larger group of these crusts, somewhat compressed at the sides, like a honeycomb (*Porrigo favosa*). *c*, Another group, which occurred on the shoulder of a young girl. No hairs passed through the centre of these crusts. *d*, Large isolated crusts in an advanced stage of growth, the external ring is cracked, and the friable centre is enlarged and elevated. *e*, Numerous crusts aggregated together, so as to form an irregular elevated mass. Traces of the original form may be observed in the cracked rings round the margin. (*Natural size.*)

sitic pityriasis of the scalp, I believe to be a modification of favus, and consider it a good rule, in all chronic eruptions on the head, to examine the crusts microscopically.

The other local symptoms are merely those which result from the greater or less degree of irritation produced in different persons by the changes above referred to. At first, scarcely any uneasiness is felt; perhaps occasional slight itching of the part. As the disease progresses, however, the itching becomes more intolerable, and induces the patient to rub and scratch the scalp. By these means, several of the crusts are forcibly torn from their attachments, and considerable effusion of serous fluid and blood is produced. Sometimes inflammation is thus occasioned. Impetiginous pustules are frequently formed, or suppuration produced, terminating in ulceration, and the discharge of an ichorous fluid from beneath the crusts. At an advanced stage of the disease, the peculiarly offensive odour exhaled is insupportable to those who surround the individual, and the ichorous discharge, vermin, and crusts, which cover the affected parts, present a most disgusting appearance.

Although the disease most commonly attacks the hairy scalp, it may occur on the forehead, temples, cheeks, nose, chin, ears, shoulders, arms, abdomen, lumbar region, sacrum, knees, and legs. Alibert gives a plate in which it is figured in all these situations. I have myself seen it on the cheek, shoulders, back, arms, and inferior extremities, and in some of these situations I could detect no hairs perforating the capsules. (Fig. 429, *c.*)

The constitutional symptoms are of the utmost importance, but, generally speaking, receive little attention from practitioners. In most of the individuals affected, who have come under my notice, the general health has been greatly deranged, and a scrofulous or cachectic constitution more or less evident. In some the *facies scrofulosa* of authors has been well marked; in others there were engorgements of the lymphatic glands of the neck; and in the only fatal case which has come under my observation, there were found tubercular depositions in the lungs, mesenteric glands, and other textures. Indeed, the generality of individuals who die labouring under favus, perish from phthisis, or other forms of tubercular disease. The beautiful plates published by Alibert, are in this respect far from being true to nature; for whilst the capsules and crusts are accurately drawn, the individuals affected seem to me ideal personages, enjoying the most robust health, and possessing even the utmost beauty of form and feature. In the generality of cases, on the contrary, the patient is thin, the countenance is of a dirty yellow colour, and the whole aspect betrays depression of the vital powers. The appetite is often impaired, the alvine evacuations irregular, and the functions of digestion and nutrition are impeded. Numerous writers have observed the physical and mental development of the individual to be retarded; and Alibert gives instances where the epoch of puberty was considerably delayed.

By those not well accustomed to the diagnosis of skin diseases, favus has often been confounded with other eruptions of the scalp, more especially eczema and impetigo, or the combination of these diseases known as the eczema impetiginodes. In none of these eruptions, however, do the yellow crusts or scales present traces of vegetations when examined microscopically. This, therefore, furnishes the real diagnostic and pathognomonic character of the disease.* Occasionally, as has been stated, favus presents a scaly character. It has then been called Pityriasis. On examination of the scurf, however, the epidermic scales will be found associated with the Achorion Schœnleini, in various stages of development.

Causes.

Alibert considered the disease hereditary, and gives cases confirmatory of this view. As regards age, it is by far most common in children between the ages of three and twelve years. In infancy, and after puberty, it is more rare, although sometimes present; and in a few instances it has been observed in persons advanced in years. In almost all the cases which have come under my notice, the individuals have been exposed to causes which depress the vital powers, and are well known excitants of tuberculous disease. Close questioning will usually elicit that they are of a scrofulous family; have been exposed for some time to infected or corrupted air; inhabited small rooms, or confined streets, or dwellings situated in unhealthy situations; that the aliment has not been very nutritive, etc. etc. Hence why the disease is common in workhouses and jails, and most prevalent amongst the poorer classes of the population, and individuals who obtain a precarious existence.

Almost every writer on the disease considers it to be contagious. Bateman, Guersent, and others, speak of its spreading amongst schoolboys, from the employment of the same towels, combs, caps, etc. Gibert has seen it propagated in the wards of St. Louis from the same cause. It has been observed, he says, two or three times to be communicated by young people kissing each other, when it has appeared in the chin or neighbourhood of the mouth. Mahon even pretends to have contracted favus incrustations on his fingers, from having neglected to wash them after dressing the heads of those affected. Alibert, in his early writings, also thought it to be contagious. In his later works, however, he evidently doubts it, says that much exaggeration has been made use of on this subject, and states that the *amour propre* of parents usually induces them to ascribe the origin of so disgusting a

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* I am not aware that this peculiar disease has ever been observed in any of the lower animals. I may therefore mention, that I have seen it on the face of a common house mouse, in which animal the same cryptogamic vegetations were to be detected as in man. Dr. Carter has confirmed this observation in a communication he brought before the Royal Medical Society of this city, during the session 1856-57.

disease to external communication. He further observes, "Mes élèves ont souvent tenté d'inoculer en notre présence, le produit de l'incrustation faveuse, sous plusieurs formes, et en variant les procedés. Le plus souvent il n'est rien resulté, dans d'autres cas est survenue une inflammation passagère, qui s'est bientôt évanouie—parfois une suppuration semblable qui pourrait s'établir par tout irritant mechanique, ou par l'insertion d'une substance étrangère dans le tegument."* Gruby also, on discovering its vegetable nature, inoculated thirty phanerogamous plants, twenty-four silk-worms, six reptiles, four birds, and eight mammifera, but only produced the disease once, and then in a plant. The human arm was inoculated five times, but, independent of a slight inflammation and suppuration, no effect was produced.

Sixteen years ago I inoculated myself and others many times with a view of determining whether favus was or was not contagious. But in none of these experiments, performed in various ways, and frequently repeated so as to avoid fallacy, could I succeed in causing the plant to germinate on parts different from those on which it was originally produced. In other words, I could not communicate the disease to other individuals, or from one part of the same individual to another.

At the time I did not consider these experiments (performed in 1841-2) as decisive of the question, although they show that it is with great difficulty inoculation succeeds. Shortly after, Dr. Remak, of Berlin, communicated the disease to his own arm in the following way :—He fastened portions of the crust upon the unbroken skin, by means of plaster. In fourteen days, a red spot, covered with epidermis, appeared, and in a few days more a dry yellow favus scab formed itself upon the spot, which, examined microscopically, presented the mycodermatous vegetations characteristic of favus.† Mentioning this fact to my polyclinical class, at the Royal Dispensary, in the summer of 1845, one of the gentlemen in attendance volunteered to permit his arm to be inoculated. A boy, called John Bangh, æt. 8, labouring under the disease, was at the time the subject of lecture, and a portion of the crust, taken directly from this boy's head, was rubbed upon Mr. M.'s arm, so as to produce erythematous redness, and to raise the epidermis. Portions of the crust were then fastened on the part by strips of adhesive plaster. The results were regularly examined at the meetings of the class every Tuesday and Friday. The friction produced considerable soreness, and, in a few places, superficial suppuration. Three weeks, however, elapsed, and there was no appearance of favus. At this time, there still remained on the arm a superficial open sore about the size of a pea, and Mr. M. suggested that a portion of the crust should be fastened directly on the sore. This was done, and the whole covered by a circular piece of adhesive plaster about the size of a crown piece. In a few days, the skin surrounding the inoculated part appeared red, indurated, and covered with epidermic scales. In ten days, there were first perceived upon it minute bright yellow-coloured spots, which, on examination with a lens, were at once recognised to be spots of favus. On examination with the microscope, they were found to be composed of a minute granular matter, in which a few of the cryptogamic jointed tubes could be perceived. In three days more, the yellow spots assumed a distinct cupped shape, perforated by a hair; and in addition to tubes, numerous sporules could be detected. The arm was shown to Dr. Alison; and all who witnessed the experiment being satisfied of its success, I advised Mr. M. to destroy each favus spot with nitrate of silver. With a view of making some further observations, however, he retained them for some time. The capsules were then squeezed out, and have not since returned. Mr. M. had light hair, blue eyes, a white and very delicate skin. There is every reason to believe that the strips of plaster employed in the first attempt shifted their position, and that the crust was only properly retained by the circular piece of plaster employed in the second experiment.

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* Traité des Maladies de la Peau, fol. p. 443.

† Medicinische Zeitung, August 3, 1842.

That the disease, therefore, is inoculable, and capable of being communicated by contagion, there can be no doubt, a result which accords with the observations of most practitioners, and with numerous recorded facts. (Case CLXXII.) It must also be evident that it does not readily spread to healthy persons, and that there must be either a predisposition to its existence, or that the peculiar matter of favus must be kept a long time in contact with the skin previously in a morbid condition.

Pathology.

We have seen, when describing the symptoms and mode of development of the disease, that it is not essentially pustular, and that the pustules occasionally present are accidental. On the other hand, it has been shown that the peculiar favus crust is composed of a capsule of epidermic scales, lined by a finely granular mass; that from this mass millions of cryptogamic plants spring up and fructify; and that the presence of these vegetations constitutes the pathognomonic character of the disease.

In order to examine the natural position of these vegetations microscopically, it is necessary to make a thin section of the capsule, completely through, embracing the outer layer of epidermis, amorphous mass, and light friable matter found in the centre. It will then be found, on pressing this slightly between glasses, and examining it with a magnifying power of 300 diameters, that the cylindrical tubes (*thalli*) spring from the sides of the capsule, proceed inwards, give off branches dichotomously, which, when fully developed, contain, at their terminations (*mycelia*), a greater or less number of round or oval globules (*sporidia*). These tubes are from the $\frac{1}{400}$ to $\frac{1}{600}$ of a millimetre in thickness, jointed at irregular intervals, and often contain molecules, varying from $\frac{1}{10,000}$ to $\frac{1}{1000}$ of a millimetre in diameter. The longitudinal diameter of the sporules is generally from $\frac{1}{300}$ to $\frac{1}{100}$, and the transverse from $\frac{1}{300}$ to $\frac{1}{150}$ of a millimetre in diameter (Gruby). I have seen some of these, oval and round, twice the size of the others. The long diameter of the former measured $\frac{1}{75}$ of a millimetre. The mycelia and sporules agglomerated in masses are always more abundant and highly developed in the centre of the crust. The thalli, on the other hand, are most numerous near the external layer. There may frequently be seen swellings on the sides of the jointed tubes, which are apparently commencing ramifications.

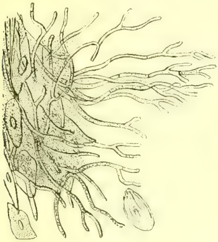
Fig. 430.

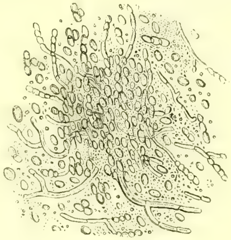
Fig. 431.

On examining the hairs which pass through the favus crusts, it will often be found that they present their healthy structure. At other times, however, they evidently contain long, jointed branches, similar

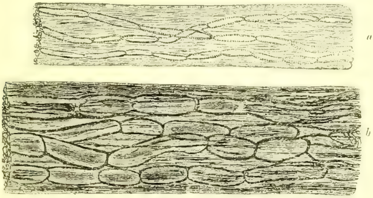

Fig. 432.

Fig. 430. Branches of the *Achorion Schoenleini*, in an early stage of development, growing from a molecular matter, and mingled with epidermic scales, from a very minute Favus crust.

Fig. 431. Fragments of the branches more highly developed, with numerous sporules and molecular matter, from the centre of an advanced Favus crust. 300 *diam.*

Fig. 432. *a*, A light hair, containing branches of the *Achorion Schoenleini* (magnified 300 diameters linear). The wood-cutter has made the branches too beaded. *b*, A darker coloured hair, containing branches of the plant. 800 *diam* to those in the crust, running in the long axis of the hair, which is exceedingly brittle. I have generally found these abundant in very chronic cases; and on adding water, the fluid may be seen running into these tubes by imbibition, leaving here and there bubbles of air, more or less long. There can be very little doubt that the tubes and sporules, after a time, completely fill up the hair follicle, and from thence enter the hair, causing atrophy of its bulb, and the baldness which follows the disease. The various steps of this process, however, I have been unable to follow, never having had an opportunity of observing favus in the dead scalp, and of making proper sections of the skin.

Several writers on favus have treated its vegetable nature as a mere hypothesis. At first it was considered, as by Mr. Erichsen,* to be "founded merely upon the outward appearance, sufficiently strong certainly, which the cup-shaped crust of favus offers to lichens, or vegetations of a similar description." Subsequently favus was supposed to consist of a mass of cells; and it was argued by Dr. Carpenter† that the vesicular organization is common to animals as well as plants; and hence "to speak of *Porrigo favosa*, or any similar disease, as produced by the growth of a vegetable within the animal body, appears to the author a very arbitrary assumption." Mr. Erasmus Wilson, in his work on "Diseases of the Skin" (p. 430), as well as in a special "Treatise on Ringworm," is also opposed to the idea of favus owing its essential characters to a vegetable growth. He considers that the peculiar branches and oval bodies previously described are mere modifications of epidermic cells, which in some cases he is of opinion mav be transformed into pus cells—in others, into those observed in favus. The branches of the plant he calls "cellated stems," and the sporules, secondary cells; and argues, that mere resemblance to a vegetable formation is not sufficient to constitute a plant. He says, "The statement of the origin of the vegetable formations by roots implanted in the cortex of the crust is unfounded; the secondary cells bear no analogy to sporules or seeds; and it is somewhat unreasonable to assign to an organism so simple as a cell the production of seeds, and reproduction thereby, when each cell is endowed with a separate life, and separate power of reproduction."‡ Lastly, M. Cazenave,§ although he acknowledges himself to be no histologist, says he has sought for the sporules many times, and believes himself authorised to conclude that their detection is not always so easy as is supposed (p. 225). Finally, he denies that favus is a vegetable parasite, and maintains it to be a peculiar secretion, originating in the sebaceous glands (p. 236).

With the exception of Mr. Wilson, who appears carefully to have examined the favus crust, the opposition to the vegetable nature of this production seems to have originated in very imperfect notions as to its intimate structure on the one hand, and that of certain cryptogamic plants on the other. For if long hollow filaments, with partitions at intervals, containing molecules within their cells, springing from an unorganized granular mass, and giving off towards their extremities round oval bodies, or sporules, arranged in bead-like rows, be not vegetables, what are they? The animal tissues present nothing similar, while numerous plants, long known to botanists, present the same identical structure. But not only must they be referred to the vegetable kingdom, but to a considerably elevated position among the cryptogamic plants. The *protococcus nivalis* and *torula cerevisiæ*, universally considered as plants, together with the *sarcina ventriculi*, described by Goodsir, are immeasurably beneath them in complexity of structure; and many of the *mucores* or moulds growing in damp places are, as I have satisfied myself by repeated examination, much more simple in their organism. Any one who looks over the cryptogamia of Greville will at once detect the strong analogy between the structures found in favus and the *penicilium glaucum* of Link, the *aspergillus penicillatus*, *acrosporium monilioides*, *sporotorium minutum*, *nostoc cæruleum*, and other plants therein figured. Indeed, it seems to me surprising how the vegetable nature of these structures can for a moment be doubted by any one who has personally examined them, especially under powers of from six to eight hundred diameters linear.

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* Medical Gazette, December 1841, p. 415.

† Principles of Physiology, p. 453.

‡ On Ringworm, 1847, p. 23.

§ Traité des Maladies du Cuir Chevelu, 1850.

In considering whether the structures described, and now by every one acknowledged to exist in the favus crusts, really belong to the vegetable kingdom, we should remember that they are not the only formations of this kind which have been found to grow parasitically in living animals. In my original paper,[*] I described others growing in phthisical cavities, in the sordes on the gums and teeth of typhus patients; and pointed out that they had been observed in the living tissues of mollusca, insects, reptiles, fishes, birds, and mammiferous animals. These observations have subsequently been confirmed by numerous pathologists and naturalists. Lastly, we cannot overlook the opinion of botanists themselves concerning this question. The most eminent mycologists, so far as I am aware, have no doubt of the vegetable nature of favus. Dr. Greville, to whom I exhibited them, was quite satisfied of the fact. Brogniart, according to Gruby, and Messrs. Link and Klotzsch, to whom they were shown by Remak, expressed a similar opinion. Brogniart considers them to belong to the genus Mycoderma of Persoon. J. Müller places them among the genus Oidium; but both Link and Klotzsch consider that they ought to constitute a distinct genus. The former, in consequence, has given it the generic name of Achorion (from achor, the old term for favus), and added to it the designation of the discoverer, Schönlein. The following is his description of the plant:—

"*Achorion Schoenleini nobis, orbiculare, flavum, coriaceum, cuti*

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[*] Edin. Philosophical Trans. 1842.

humanae praesertim capitis insidens; rhizopodion molle, pellucidum, floccosum, floccis tenuissimis, vix articulatis, ramosissimis, anastomoticis (?); mycelium floccis crassioribus, subramosis, distincte articulatis, articulis inaequalibus irregularibus in sporidia abeuntibus; sporidia rotunda, ovalia vel irregularia, in uno vel pluribus lateribus germinantia.*"

The *mode of development* from sporules has now been determined with considerable exactitude. Remak made small grooves on the cut surface of a fresh apple; placed portions of the favus crust in them; then laid the apple, with the cut surface turned upwards, in moist sand; and covered the whole with a glass bell. Under these circumstances, he found that the sporules developed themselves, and he examined them frequently up to the sixth day, when the surface of the apple became of a brown colour, and was covered with a rapid growth of *Penicilium glaucum*, or other kind of mould, among which the structure peculiar to favus could no longer be traced. These observations, however, showed that the sporules of the Achorion undergo development in the same manner as those in other cryptogamic plants. That is, the membrane which surrounds them throws out one or more prolongations, which are converted into tubes; and these, in turn, present, generally towards their extremities, a number of sporules, which at length are pushed out, or are disintegrated, and so become free. Figs. 433 and 434 represent the changes observed in the sporules germinating on the surface of the apple; and Fig. 435 shows the thalli, mycelia, and sporules, seen in the crusts, produced by inoculation, on Remak's arm.

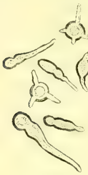
Fig. 433.

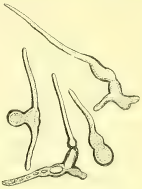
Fig. 434.

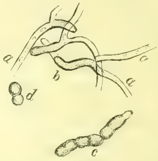

Fig. 435.

The method of reproduction and formation of sporules may be observed with great facility in any well-developed favus crust, especially under powers varying from 500 to 800 diameters linear. Thalli, with variable-sized cells, may be observed branching at the extremities, with sporules forming within them. These are conjoined with separated mycelia, containing well-developed sporules, many of which are also free, as in the figure below.

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* I have never seen any anastomosis.

Fig. 433. Sporules developing on the surface of an apple, after three days.

Fig. 434. The same, after four days.

Fig. 435. The same, more fully developed on the human arm, after inoculation. *a*, Thalli, with pale walls; *b*, containing sporules (mycelia); *c*, mycelium separated from the thallus; *d*, sporules separated from the mycelium—(*after Remak.*) 300 *diam.*

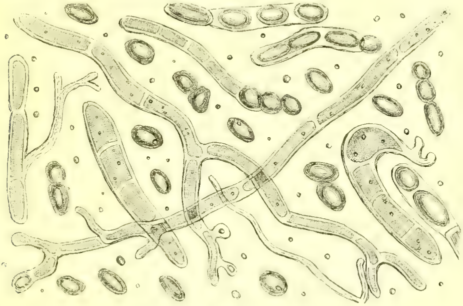

Fig. 436.

It follows, therefore, that all the circumstances connected with the development and mode of reproduction of the Achorion Schoenleini have been fully ascertained.

The seat of favus has been much disputed by authors. By some it has been located in the piliferous bulbs or follicles (Duncan, Baudelocque, Rayer), by others in the sebaceous glands (Sauvages, Underwood, Murray, Mahon, and lately by Cazenave), and a third party in the reticular tissue of the skin (Bateman, Gallot, Thompson). According to Gruby the plants grow in the cells of the epidermis, the true skin is compressed, not destroyed, and the bulbs and roots of the hairs and sebaceous follicles are only secondarily affected.

I have made observations to determine the correctness of this statement, and found that the whole inferior surface of the capsule is formed of epidermic scales, thickly matted together. These are lined by finely molecular matter, from which the plants appear to spring, and which unites the branches and sporules together in a mass. Superiorly, however, the epidermic scales are not so dense; and I have always found them more or less broken up, and not continuous. This observation is valuable, as indicating the probable mode in which these plants, or the sporules producing them, are deposited on the scalp. It will be seen that the appearance of the peculiar porrigo capsule was invariably preceded by a desquamation of the cuticle, that is, a separation or splitting up of the numerous external epidermic

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Fig. 436. Thalli, mycelia, and sporidia, of the *Achorion Schoenleini*, showing the mode of reproduction. 800 *diam.*

scales which constitute its outermost layer. Hence it is more probable that the sporules or matters from which the vegetations are developed, insinuate themselves between the crevices, and under the portion of epidermis thus partially separated, than that they spring up originally below, or in the thickness of the cuticle.

The chemical constitution of the matter originally exuded is supposed by M. Cazenave to be allied to fat, but it appears to me to be more probably albuminous, and allied to the molecular character of all broken down or disintegrated organic material in which fungi grow. We have seen that, previous to the return of favus crusts, the head is always covered with broken-up epidermis, more or less disintegrated. Experiments have shown that the plants will not grow on the healthy skin, and that inoculation succeeds only in places where pustules have previously been formed. It is also exceedingly probable that, when favus is communicated from one person to another, the part affected (generally the scalp) has been the seat of some other eruption (Case CLXXII.), or is not particularly clean.

Mr. Erichsen considered, "That the matter of favus is a modification of tubercle—that it is a tubercular disease of the skin. By tubercular I do not mean a disease like lupus, characterised by small firm tumours, but a disease, the nature of which consists in the deposition of that *heterologous* formation called tubercle." This view of the nature of favus I have long held; and it was distinctly stated by me, when treating of the pathology of scrofula, in a work published in 1841.* The favus crust, however, is not constituted wholly of tubercular matter. The peculiar exudation only constitutes the soil from which the mycodermatous vegetations spring, as I shall now endeavour to show.

Gruby describes the mycodermata of favus as springing from an amorphous mass, of which the periphery of the capsule is composed. This mass undoubtedly exists, and, according to my observations, is composed of a finely molecular matter, identical in structure to certain forms of tubercle, or recently coagulated exudation. The cheesy matter, for instance, so frequently found on the secreting surface of serous membranes, and in tubercular cavities and other structures in chronic cases of tuberculosis, or general tendency to tubercular deposition, presents this character. Every pathologist who has minutely examined tubercle recognises a granular form in which there is no trace of nucleus or cell, and which, therefore, we are warranted in considering as unorganised. I have myself repeatedly examined this tubercular matter, and been unable to detect any difference between it and the mass in which the vegetations of favus appear to grow. Chemical analysis of this form of tubercle demonstrates it to be composed principally of albumen, with a minute proportion of earthy salts; sometimes there is combined with it a small quantity of fibrin or gelatine. If this general result be compared with the analysis, by Thenard, of favus matter, the identity between it and tubercle must appear highly probable. He found in 100 parts—coagulated albumen, 70; gelatine, 17; phosphate of lime, 5; water and loss, 8 parts. Thus the evidence furnished by morphology and chemistry agrees in determining the molecular matter found in the crusts of favus and of tubercle to be analogous.

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* Treatise on the Oleum Jecoris Aselli, p. 94.

Remak found that, although the sporules underwent developmental changes on the cut surface of an apple, as well as in animal fluids to which sugar had been added, no such changes took place in spring or distilled water, in the serum of blood, solution of albumen, pus, muscle, substance of brain, cut pieces of skin, or animal fat. In these cases the animal tissues, as well as the portions of favus crust, became gradually disintegrated, and infusorial formations commenced. Hence the Achorion grows under the same circumstances only as all other moulds. Putrefaction of animal or vegetable substances is unfavourable to its production; but that peculiar acid change which occurs in milk or paste, exposed to the air for some days, and in which growths of mould and confervæ are favoured, is also beneficial to the development of favus. Hence why inoculation in healthy tissues fails, and why certain exudations in peculiar states of the constitution, or disintegrated matters which have undergone particular chemical changes, probably from acid secretions of the skin, are necessary to the production of the disease.

I believe, therefore, that the pathology of favus is best understood by considering it essentially to be a form of abnormal nutrition, with exudation of a matter analogous to, if not identical with, that of tubercle, which constitutes a soil for the germination of cryptogamic plants, the presence of which is pathognomonic of the disease. Hence is explained the frequency of its occurrence in scrofulous persons, and among cachectic or ill-fed children; the impossibility of inoculating the disease in healthy tissues, or the necessity for there being scaly, pustular, or vesicular eruptions on the integuments, previous to contagion. But as experiments have proved the possibility of inoculation in healthy persons, it follows that the material in which the vegetations grow, may at the commencement, in a molecular exudation, be formed primarily or secondarily. That is, there may be want of vital power from the first, as occurs in scrofulous cases, or there may have been production of cell forms, such as those of pus or epidermis, which, when disintegrated and reduced to a like molecular and granular material secondarily, constitute the necessary ground from which the parasite derives its nourishment, and in which it grows.

Treatment.

Almost every species of treatment has been had recourse to, in order to remove this disagreeable and intractable disease; and there can be no doubt, that cases have recovered under the use of all and each of the methods recommended. In some instances, favus wears itself out, or rather, as the development of the frame proceeds, and the constitutional strength improves, the conditions necessary for its production and maintenance are removed, and it consequently disappears. In every case, however, it must be our object to get rid of the disease permanently as soon as possible, and this is only to be done by removing the pathological conditions on which it depends.

The notion that it originates in the bulbs of the hair caused an attempt to remove the disease by eradicating the structures with which it was supposed to be connected. Hence the barbarous and cruel treatment by means of the *Calotte.* This consisted in spreading a very adhesive plaster inside a cap, which closely fitted the shaven scalp. The hair was then allowed to grow and insinuate itself amongst the substance of the plaster—when the whole was forcibly torn off. In this way, portions of the scalp were sometimes separated—at others, pieces of the plaster remained firmly attached, and gave great trouble. A modification of this plan consisted in covering the head with the plaster in strips, which were removed separately from before backwards, and from behind forwards, so as to tear out the hairs. Even this plan failed. The practice I saw adopted in Berlin, in 1841, consisted in plucking out the hairs individually with a pair of pincers; but this tedious and painful method, also, was found to be of little service.

In Paris the above kinds of practice have generally been put aside, for the milder empiric treatment of the frères Mahon. Between the years 1807 and 1813, 439 girls and 469 boys, affected with favus, were cured by them at the Bureau Central des Hôpitaux, and the mean duration of the treatment was 56 applications. These applications are generally made every other day, so that the average length of treatment by this much boasted and successful method is three months and a-half.

I have endeavoured to show, however, that in many cases it is a constitutional disease, and dependent upon the causes which induce scrofulous diseases in general. The treatment, therefore, in such ought to be constitutional, and directed to removing the tendency to tubercular exudation, on which the malady depends. No doubt, however, a local treatment in this, as in all disorders which are at the same time general and local, is of the utmost service.

I consider, then, that the chief indications of treatment are—1st, To remove the constitutional derangement; and, 2dly, To employ such topical applications as tend to prevent the development of vegetable life. This line of practice may be thought similar to that recommended long ago by Lorry, who advises, 1st, A modification of the fluids and solids of the economy by a general treatment; 2dly, A vigorous attack upon the local disease by topical applications, capable of removing the crusts, causing the skin to suppurate deeply, and substituting a solid cicatrix for the morbid ulceration of the hairy scalp. For the most part, however, the general treatment of physicians has been confined to diluent drinks, blood-letting, purging, and remedies which depress the vital powers, whereas it must be evident, that if the views of its pathology I have brought forward be correct, and it is in its nature allied to tubercular affections, a treatment exactly opposite ought to be pursued. The development of vegetable life may also be prevented by the application of much milder remedies than the escharotics, or irritating ointments usually employed.

We have previously seen that tuberculosis is caused and kept up by some fault in the digestive process; that the blood is secondarily affected, and its albuminous constituents proportionally increased; that the albumen at length becomes effused into the different structures of the economy, causing the various forms of tubercular disease; and, lastly, as the albumen in the blood becomes excessive, and its effusion into the textures increases, the fatty constituents of the frame diminish. It has been shown, by numerous facts, that under such circumstances the internal and external exhibition of cod-liver oil has been attended with the most marked advantage, and often been made the means of cure when all other remedies have failed. The action of the oil appears to be the same in favus as in other forms of scrofulous disease, and its use should be combined with appropriate diet and exercise, and with reference to the same indications and contra-indications.

The local treatment I have employed for several years, is directed, in conformity with the pathological views previously detailed, to the exclusion of atmospheric air, so as to prevent vegetable growth. For this purpose, I direct, in the first instance, that the affected scalp should be poulticed for several days, until the favus crusts are thoroughly softened, and fall off. Then the head is to be carefully shaved, after which it will be found to present a shining clear surface. Lastly, cod-liver oil should be applied with a soft brush, or dossil of lint, over the affected surface morning and night, and the head covered with an oil-silk cap to prevent evaporation, and further exclude the atmospheric air. Every now and then, as the oil accumulates and becomes inspissated, it should be removed by gently washing it with soft soap and water. It is very possible common lard, or any other oil, would do as well as cod-liver oil. In one case I found a sulphurous acid lotion succeed.

I have found the average duration of this treatment to be six weeks, which contrasts very favourably with the results of MM. Mahon's practice at the Hôpital St. Louis. Some cases seem to be incurable, and these are most frequent among adults; but even in them, so long as the scalp is kept moist with oil, and the air is excluded, the eruption will not return (Case CLXX.) In young subjects, in whom general as well as local treatment is admissible, and in whom a scrofulous disposition is manifest, the prognosis is more favourable, and the disease may be permanently eradicated (Cases CLXXI. to CLXXIII). Whenever favus is recent and of limited extent, it may at once be destroyed by cauterization with nitrate of silver (Case CLXXIV.)

Lebert is of opinion that poultices and oily applications soften the favi, and distribute the sporules over the skin. He, therefore, insists on removing the crusts dry, by means of a small spatula, sewing needles, or other instruments. He says that nothing is more easy than to detach them entire ; for, although pushed into the skin, they are not held there by any adhesion. But I think it will be found that, however dexterous a person may be in removing the crusts, that the majority are held firmly to the scalp, by means of the hair which perforates them, and that tearing these out is very painful. Besides, the crusts are easily broken, and the time and trouble required, even when they are thinly scattered, renders this plan impracticable in hospitals. When densely matted together, it, of course, cannot be done. I believe, then, that repeated poulticing is by far the best and most efficient method of freeing the skin from the eruption, whilst it has the extra advantage of doing so without irritation, and thereby diminishing the tendency to the formation of impetiginous pustules.

SECTION X.

DISEASES OF THE BLOOD.

The diseases of the blood have strongly engaged the attention of modern pathologists, who, putting aside the vague speculations which the ancients held regarding this important fluid, have sought to investigate the subject by the aid of facts derived from chemical, microscopical, and clinical researches. The general results of these have been sketched, pp. 106 to 109. The alterations of the blood give rise to many of the most important disorders which affect the body, besides being necessarily associated more or less with every morbid change connected with alterations of nutrition. It is the principal idiopathic or essential forms of blood disease which will be treated of in this place.

LEUCOCYTHEMIA.

On the 19th of March 1845, I examined the body of a man, who died under the care of Professor Christison, in the Royal Infirmary, labouring under hypertrophy of the spleen and liver, and whose blood was crowded with corpuscles which exactly resembled those of pus. This case was the first of the kind in which a careful histological examination of the blood was made, and in which the remarkable morbid condition then discovered, was separated from ordinary pyæmia, and shewn to be unconnected with any form of inflammation. It was published in the Edinburgh Med. and Surg. Journal, October 1st, 1845, vol. lxiv., p. 413. Dr. Craigie, who was present at the dissection, recognised its similarity to one he had had under his care four years previously, the blood of which had been examined microscopically by Dr. John Reid, who found "that it contained globules of purulent matter and lymph." An account of it appeared in the same number of the Edinburgh Journal for October 1845. Six weeks after these cases had been published, Professor Virchow of Berlin gave the history of another, in the second number for November 1845, of Froriep's "Notizen" (No. 780), under the name of "Leukhemia," or white blood. On the 31st of December 1845, a man was received into St. George's Hospital, London, in whom Dr. Fuller detected, both before and after death, the increased number of colourless corpuscles in the blood. This man, like the other individuals, had great hypertrophy of the spleen. A notice of the case is inserted in the "Lancet," for July 1846. Since then several similar cases have been met with, in which this morbid condition of the blood has been determined to exist, by an accurate examination with the microscope; and a reference to the records of medicine has shown the previous occurrence of like cases. In these last, the blood, with two exceptions, was not physically proved to contain an unusual number of colourless corpuscles, although now on looking back upon the facts which are mentioned in regard to them, we can have little doubt that such was the case. The exceptional cases occurred to M. Barth in 1839, and Dr. Craigie in 1841. In the first, M. Donné found one-half the corpuscles in the blood to be "mucous globules," and in the second, Dr. John Reid found that the blood "contained globules of purulent matter and lymph."*

The term "Leukhemia," or white blood, given to this disease by Virchow, is faulty, because, in the first place, as was correctly stated by Dr. Parkes, the blood is not white, but presents its usual red tinge when drawn from the arm. The colourless clots occasionally observed after death will certainly not warrant the application of this term to the blood generally, as they are frequently present without the morbid condition under consideration. Besides, the same name (white blood) has been given with more propriety to the fatty blood, examined by Drs. Traill, Christison, and others, which presents a milky, opalescent appearance. At the meeting of the Academy of Medicine in Paris, on January 29th, 1856, the members were naturally enough led into great confusion in consequence of not keeping this distinction in view. What ought to be expressed is, that the blood abounds in colourless corpuscles, and this is done by the term Leucocythemia—from λευκὸς, white; κυτος, cell; and αίμα, blood—literally, white cell blood, which expresses the simple fact, or pathological state, and involves no theory. Throughout England and France this name has been universally adopted.

CASE CLXXVI.†—*Leucocythemia discovered after death—Hypertrophy of the Spleen, Liver, and Lymphatic Glands—Absence of Phlebitis and of Purulent Collections in any part of the body.*

HISTORY.—John Menteith, aged 28, a slater—admitted into the clinical ward of the Royal Infirmary February 27, 1845, under the care of Dr. Christison. He is of dark complexion, usually healthy and temperate; states that twenty months ago he was affected with great listlessness on exertion, which has continued to this time. In June last he noticed a tumour in the left side of the abdomen, which has gradually increased in size till four months since, when it became stationary. It was never painful till last week, after the application of three blisters to it; since then, several other small tumours have appeared in his neck, axillæ, and groins, at first attended with a sharp pain, which has now, however, disappeared from all of them. Before he noticed the tumour, he had frequently vomiting in the morning. The bowels are usually constipated, appetite good, is not subject to indigestion, has had no vomiting since he noticed the tumour; he has used chiefly purgative medicines, especially croton oil; employed friction with a liniment, and had the tumour blistered.

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* Gazette Hebdomadaire, Mars 21, 1856, and Edin. Med. and Surg. Journal, October 1845.

† This case occurred in the clinical ward of Professor Christison, who treated it. The body after death was most carefully inspected by me as pathologist to the Royal

Symptoms on Admission.—On admission, there is a large tumour, extending from the ribs to the groin, and from the spinal column to the umbilicus, lying on the left side. It is painful on pressure near its upper part only. Percussion is dull over the tumour; pulse 90; states that for three months past he has not lost in strength. There is slight œdema of the legs. *To have two pills of iodide of iron morning and evening.*

Progress of the Case.—*March 1st.*—Urine of yesterday somewhat turbid when just passed, natural in colour, acid to litmus; sp. gr. 1013. Sediment presents cubic crystals under the microscope, disappears almost entirely on the addition of aqua potassæ, but is unaffected by nitric acid. The filtered urine is not affected by aqua potassæ, and yields only a slight white haze when boiled. *March 9th.*—Œdema of legs increased. They have been bandaged with flannel rollers. ℞ *Potassæ Carbonatis*, ʒi; *Spiritus Ætheris Nitrici*, ℥iv; *Aquæ Menthæ*, ℥iij; *Aquæ fontis*, ℥ij. M. *Sumat unciam ter in die. March* 10*th.*—Tormina and considerable diarrhœa; urine not increased. *Habt. haustum ex Olei Ricini*, ℥ss *statim; et exactis quatuor horis Opii*, gr. ii. *March* 13*th.*—Attacked this morning with heat of skin; thirst; pulse 110, full, very compressible. The diarrhœa, which had been checked, returned yesterday; none this morning after taking an opium pill. Urine 100 ounces. *Omittantur medicamenta. Sumat statim Pulveris Ipecacuanhæ et Opii*, gr. x, *et repetatur dosis singulis semihoris ad tertiam vicem. March* 14*th.*—No sweating from the powders; diarrhœa still rather troublesome; pulse 100, softer; tongue dry and brown; febrile expression of countenance, resembling that of typhus. ℞ *Aquæ Acetatis Ammoniæ*, ʒvi; *Solutionis Morphiæ*, ʒi; *Aquæ fontis*, ℥iij; *Syrupi*, ℥j. *Sumat unciam quartâ quâque horâ. Habt. decoctum hordei pro potu. March* 15*th.*—Died suddenly in the morning.

Sectio Cadaveris.—March 19 (*four days after death*).

Externally, the body presented a considerable prominence of the ensiform cartilage and false ribs on both sides. The abdomen was contracted; considerable dulness on percussion on left side, which had previously been marked out by a line formed with nitrate of silver. No ascites nor œdema of the limbs.

Blood.—The blood throughout the body was much changed. In the right cavities of the heart, pulmonary artery, venæ cavæ, venæ azygos, external and internal iliac veins, and many of the smaller veins leading into them, it was firmly coagulated, and formed a mould of their size and form internally. In the cavities of the heart and venæ cavæ, the blood, when removed, was seen to have separated

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Infirmary, and parts were removed for careful subsequent examination, and for preservation, the appearances being altogether of a kind quite new to me. The case, for reasons which will appear in the sequel, is here given verbatim, as it was originally published in the Edinburgh Journal for 1st October 1845.

into a red or inferior, and a yellow or superior, portion. The red portion was of a brick-red colour; it did not present the dark purple smooth and glossy appearance of a healthy coagulum, but was dull and somewhat granular on section, and when squeezed readily broke down into a grumous pulp. The yellow portion was of a light yellow colour, opaque and dull, in no way resembling the gelatinous appearance of a healthy decolorised clot. When squeezed out of the veins, as was sometimes accidentally done where they were divided, it resembled thick creamy pus. In some portions of the veins, the clot was wholly formed of red coagulum. In others, it was divided into red and yellow. In a few places the yellow formed only a streak or superficial layer upon the red, or covered the latter with spots of various sizes. Whether this coagulum existed in all the veins, could only have been ascertained by a complete dissection of the body. It was seen, however, that the femoral veins, after passing under Poupart's ligament, were empty and perfectly healthy as far down as the Sartorius muscle. The external and internal iliac veins, as well as the pelvic veins, were full and distended. The azygos, both axillary and jugular veins, were full, also the longitudinal, the lateral, and other sinuses at the base of the cranium, and veins ramifying on the surface of the brain. In this last situation some of the veins appeared as if full of pus, whilst others were gorged with a dark coagulum—(See Fig. 439.) In the aorta and external arteries were a few small clots, resembling those found in the veins. These vessels, however, were comparatively empty. The basilar artery at the base of the brain was distended with a yellow clot.

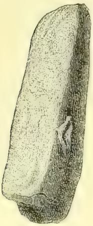

Fig. 437.

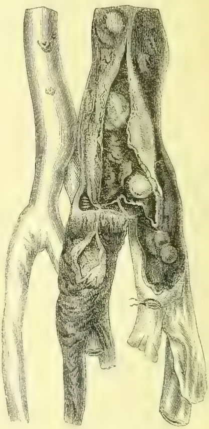

Fig. 438.

Vessels.—The arteries and veins themselves were perfectly healthy. Although carefully looked for, in no place could thickening or increased vascularity be observed. Nowhere was the clot adherent to the vessels, but, on the contrary, it readily slipt out when an accidental puncture was made in them.

Head.—On removing the dura mater, the veins which empty themselves into the longitudinal sinus were considerably engorged, especially posteriorly. Some

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Fig. 437. Portion of clot from the vena cava, showing the divisions into red and white coagula. *Half the real size.*

Fig. 438. Posterior surface of the aorta and vena cava. An incision has been made in the latter, to show that it is not thickened or diseased, as well as to expose colourless coagula even in the most depending portions of the clot. *Half the real size.*

were filled with the red, and others with the yellow clot previously described. Others, again, were half filled with red and half with yellow coagulum, the passage of the one into the other being clearly perceived. Both hemispheres, with the longitudinal sinus and *falx in situ*, were removed by a section across the brain, as low down as the division of the cranium would permit. The brain was then discovered to be very soft uniformly,—a circumstance accounted for by the time which had elapsed since death. The part removed was put aside, in order to be preserved and hardened in spirit. The lateral ventricles were found healthy, contained no serum, and the choroid plexus was perfectly normal. At the base of the brain the basilar artery was seen distended with the yellow coagulum, as were also a few of the arteries, but to a very slight extent. The substance of the brain itself was throughout healthy. All the sinuses at the base of the cranium gorged with the red coagulum.

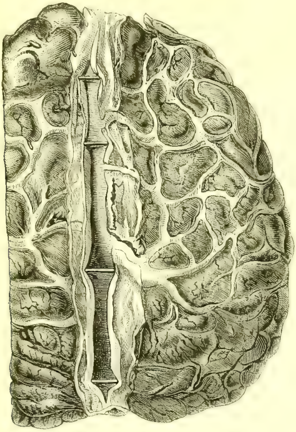

Fig. 439.

Chest.—A few chronic adhesions united the pleuræ on both sides, which were easily torn through. Both lungs were slightly engorged posteriorly and inferiorly. The anterior margin of the left lung emphysematous, but to no great extent. On section, the yellow coagulum of the blood was observed to occupy all the ramifications of the pulmonary artery. In some places it was so consistent as to be drawn out, exhibiting an arborescent form; in others, it was more soft, and exuded from the cut surface like thick pus. Heart somewhat enlarged; weighed, when freed

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Fig 439. Appearance of the upper surface of the hemispheres after removing the dura mater, showing the remarkably white appearance of the coagula in the veins and longitudinal sinus. *Half the real size.*

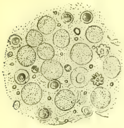
from coagulum, eleven and a half ounces. Its texture was healthy; the valves normal. The right auricle much distended, and gorged with a firm coagulum, the upper third of which was found composed of the yellow, and the two inferior thirds of the red clot formerly described. The right ventricle and pulmonary artery were similarly distended; portions of the clot closely embraced the columnæ carneæ, but were in no place adherent. The coronary arteries and veins were normal.

Abdomen.—On the inferior surface of the diaphragm there existed a firm, almost cartilaginous, deposit, about a line in thickness, of a white colour, oval form, two inches long by one and a half broad, with irregular margins, which were composed of several rounded tubercular bodies, the size of a small pea, and of a fibrous structure. The liver enormously enlarged from simple hypertrophy. Its structure throughout healthy. Gall-bladder enlarged, and distended with a clear pale yellow bile. The whole weighed ten pounds twelve ounces. The spleen also enormously enlarged from simple hypertrophy. It was of a spindle shape, largest in the centre, tapering towards the extremities. It weighed seven pounds twelve ounces. It measured in length fourteen inches; in breadth, at its widest part, seven inches; and in thickness, four and a half inches. Towards its anterior surface was a yellow firm exudation, about an inch deep, and three inches long. The peritoneum, also covering a portion of its anterior surface, was thickened, opaque, and dense over a space about the size of the hand. Both kidneys healthy. The stomach and intestines healthy throughout. About four inches from the anus the superior hemorrhoidal veins were distended on both sides external to the rectum. They formed two chains of tumours about three inches long, consisting, on the one side, of three swellings as large as a walnut; on the other, of one swelling somewhat larger. They were filled with a red coagulum, broken down into a grumous mass. The lymphatic glands were everywhere much enlarged. In the groin they formed a large cluster, some being nearly the size of a small hen's-egg, and several being that of a walnut. The axillary glands were similarly affected. The bronchial glands were not only enlarged, but of a dark purple colour, and in some places black from pigmentary deposit. The mesenteric glands were of a whitish colour, some as large as an almond nut. A cluster of these surrounded and pressed upon the ductus communis choledochus. The lumbar glands were of a greenish-yellow colour, also enlarged, forming a chain on each side, and in front of the abdominal aorta, more especially at its bifurcation into the iliacs.

No collection of pus could be found in any of the tissues.

Microscopic Examination.—The yellow coagulum of the blood was composed of coagulated fibrin in filaments, intermixed with numerous colourless corpuscles, which could be readily squeezed out from it when pressed between glasses. Where the yellow coagulum was unusually soft, the corpuscles were more numerous, and the fibrin was broken down into a diffluent mass, partly molecular and granular, partly composed of the debris of the filaments broken into pieces of various lengths, The corpuscles varied in size from the 80th to the 120th of a mill. in diameter; they were round, their cell-wall granular, and presented all the appearance of pus corpuscles. (Fig. 440.) Water caused them to swell and lose their granular appearance, and acetic acid dissolved the cell-wall and caused a distinct nucleus to appear. This nucleus was composed sometimes of one large granule about the 200th of a mill. in diameter, at others of two or three smaller granules, as is seen in corpuscles of laudable purulent matter. (Fig. 442.) The red portion of the coagulum contained a smaller number of these colourless corpuscles, mixed with a multitude of normal yellow corpuscles. (Fig. 441.) The colourless corpuscles now described were found in the blood throughout the system. They were seen in the veins and arteries ramifying on the brain, in the coronary veins, hemorrhoidal tumours, and wherever the blood was examined. On stripping off a portion of the pia mater, and examining the capillary vessels of that membrane, all that were not too minute to contain them were found crowded with the same corpuscles. (Fig. 444.) This fact was confirmed by Dr. Allen Thomson, to whom I sent a portion of the brain for that purpose.

Fig. 440.



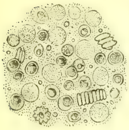


Fig. 441.

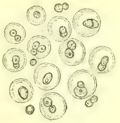


Fig. 442.

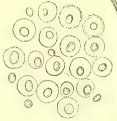


Fig. 443.

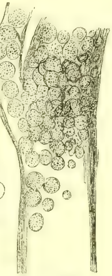


Fig. 444.

The cartilaginous deposit on the inferior surface of the diaphragm was composed of dense fibrous tissue, in which numerous granules and molecules were observed. The exudation in the spleen was composed of amorphous fibrin mixed with numerous molecules, granular and imperfect cells. These were intermingled with bundles of filamentous tissue. The enlarged lumbar glands, on being pressed, exuded a fluid that was crowded with corpuscles; some resembling the colourless corpuscles already alluded to; others oval and round, containing a distinct nucleus. (Fig. 443.)

The ultimate textures of the muscles, brain, nerves, etc., were carefully examined, and found normal.

Commentary.—I have reprinted this case *verbatim* from the original paper published by me in the Edinburgh Medical and Surgical Journal for October 1st, 1845, in order to show that it contains a careful and minute description of the facts which I discovered on examining the body, March 19th. Figs. 437 to 439 are copied from some of the preparations still in my possession, taken from the body. A cast of the spleen is in the University Museum. Numerous drawings were

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Fig. 440. Colourless corpuscles, mingled with a few coloured ones, from the white clot of the blood in Case CLXXVI.

Fig. 441. The same bodies, mingled with a larger number of yellow blood corpuscles in the red clot.

Fig. 442. Change produced on the colourless corpuscles on the addition of acetic acid, the yellow corpuscles being dissolved.

Fig. 443. Cells in the fluid squeezed from the lymphatic glands, after the addition of acetic acid.

Fig. 444. Blood-vessel giving off a capillary from the pia mater; the latter is seen filled with colourless corpuscles; the former partly with colourless, mingled with coloured corpuscles. 250 *diam.*

also made from microscopic demonstrations; some of which are represented Figs. 440 to 444.

In the remarks originally appended I observed:—" The points connected with this case that require discussion are, 1st, The connection between the symptoms and morbid appearances; 2d, Were the corpuscles contained in the blood really those of pus? and 3d, If so, how were they produced? The discussion of these theoretical points, it appears to me, has nothing whatever to do with the correctness or incorrectness of the facts above detailed, which, it will be observed, are studiously separated from everything of a hypothetical character. But in connection with the first point I observed, " It is important to remember that there was no phlebitis, abscess, or purulent collection to which the appearances within the vessels could be ascribed. In all cases of phlebitis there are changes in the vessels themselves, and the clot is more or less adherent to the vascular walls. Nothing of the kind could be detected, although particular attention was paid to this point. How far the hypertrophy of the liver and spleen may be connected with the coagulation of the blood, and the formation of pus, it is difficult to say. Whether the hypertrophy of these organs exercises a peculiar influence on the blood, or whether the change in that fluid be caused in connection with chronic diseases in general, as has been lately pointed out by M. Bouchut, further observations alone can determine."

Concerning the second point, I said, " The only bodies with which they can be confounded are the colourless corpuscles of the blood itself, the corpuscles described by Gulliver as existing in softened fibrin and those found in lymph. With regard to the colourless corpuscles of the blood, we know of no instance where they existed in the amount, or ever presented the appearance described." I then, after considering the structure of softened fibrin, came to the conclusion that the physical characters of the corpuscles found in the case of Menteith, would leave little doubt that they were identical with those of pus.

In reference to the third question, I pointed out that the corpuscles must originate in the blood system itself, in the same manner as they had been shown by M. Bouchut to occur in various forms of cachexia and chronic diseases. I distinctly separated it from what was then understood by pyæmia, or purulent absorption, saying, " Pus has long been considered as one, if not the most characteristic proofs of preceding acute inflammation. But in the case before us, what part was recently inflamed? There was none. Piorry and others have spoken of an inflammation of the blood, a true hematitis; and certainly if we can imagine such a lesion, the present must be an instance of it. But it would require no laboured argument to show, that such a view is entirely opposed to all we know of the phenomena of inflammation. Without entering into this discussion, however, I shall assume it to have been satisfactorily demonstrated that we can form no idea of this process without the occurrence of exudation from the blood-vessels, and that, consequently, the expression, inflammation of the blood, is an error in terms. A moment's reflection will make it evident that all our ideas of, and facts connected with, inflammation are associated with some local change in the economy. The constitutional disturbances connected with it are invariably ascribed to phlegmasia or fever, which pathologists hitherto have always separated. Unless, therefore, it could be shown that inflammation and fever were like processes, we must conclude that the alteration of the blood in this case was independent of inflammation properly so called."

These observations appended to the facts of the case must at least be allowed to be sufficiently suggestive, so that when, six weeks afterwards, Professor Virchow published a similar case, and said they *were* the colourless corpuscles of the blood, he merely adopted another opinion regarding them from what I had done. But, I submit, this does not entitle him to claim for himself the discovery of this morbid condition,* or to represent that, notwithstanding my distinct separation of the lesion from all known pre-existing conditions of the blood, that in my opinion it was an ordinary case of pyæmia. He was fortunate enough, however, to meet with two other cases, before I was enabled to resume the inquiry by meeting with the following one :—

CASE CLXXVII.†—*Leucocythemia detected during Life—Hypertrophy of the Spleen—Ascites.*

HISTORY.—Barney Tinlay, æt. 17, farm-servant—admitted into the clinical ward of the Royal Infirmary, January 25, 1850. With the exception of an attack of scarlet fever, which he experienced about three years ago, he enjoyed perfect health until twelve months since, when he first noticed a swelling in the abdomen, accompanied by some pain. The tumour since this period has gradually increased in size, and latterly he has been unable to walk fast on account of dyspnœa. For the last two or three years he has been employed in farm-service, and during three months last summer he resided in the fenny district of Lincolnshire, but never had intermittent fever.

SYMPTOMS ON ADMISSION.—On admission, his complexion is pale, the conjunctivæ are unusually blanched, and his whole appearance is very cachectic. On examining the abdomen, a hard tumour can be felt occupying the whole left side. Superiorly, it can be felt emerging from the false ribs about two inches to the left of the ensiform cartilage. It then passes downwards an inch and a half to the right of the umbilicus, and curves round inferiorly to a point about an inch and a half above the symphysis pubis, from which it may be traced directly backwards to within three inches of the spinous processes of the lumbar vertebræ. Its anterior margin presents a semicircular convexity, which is smooth, with a distinct notch in its upper third, and is apparently about half an inch thick, as with the fingers a fold of integument may be pressed somewhat below it. The tumour is completely dull on percussion throughout, and is in several parts painful on pressure. It measures about ten inches in the long diameter, and thirteen and a half transversely. The rest of the abdomen has the usual tympanitic percussion, and there is no fluctuation.

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* See note on the discovery of Leucocythemia at the end of this article.

† Reported by Mr. Hugh M. Balfour, Clinical Clerk.

Liver, on percussion, found to be of the natural size. Tongue clean; appetite good. There is profuse diarrhœa, the bowels being open eight or ten times a-day; this symptom has existed for the last three or four weeks. Pulse 80, weak. Complains of giddiness on assuming the erect posture. Heart sounds natural. He has occasional epistaxis and hemorrhage from the gums. Respiratory and urinary systems healthy. The appearance of the blood drawn from the extremity of the finger, when magnified 250 diameters linear, is represented Fig. 445. The coloured corpuscles for the most part have collected together in rolls, the numerous colourless corpuscles filling up the intervening space. Acetic acid dissolved the coloured bodies, and rendered the cell-wall of the colourless ones very transparent—bringing into view the nucleus, consisting of a single round or oval body in some, but in the majority presenting two, three, or even four granules, each having a depression in their centre. Here and there the nucleus was crescentic, or in the form of a horse-shoe. (Fig. 446.)

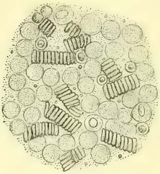

Fig. 445.

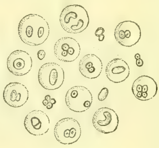

Fig. 446.

Progress of the Case.—*January 27th.*—He has had eight leeches applied to the epigastrium, and has taken the lead and opium pills—one three times a-day. The diarrhœa is much diminished, and there is less pain. ℞ *Ferri Citratis,* ʒi; *Tinct. Card. Comp.,* ℥i; *Infusi Calumbæ,* ℥vii. M. *Fiat mistura cujus sumat,* ℥i *ter in die.* ℞ *Sulph. Quinæ,* gr. iij; *Pulv. Catechu extr.* gr. iv; *Ol. Carui.* m. i. M. *Fiant pil.* ij. *Mittantur tales.* xij, *et Sig. sumat* ij, *mane et vespere. Jan. 30th.*—Diarrhœa now entirely ceased. ℞ *Pulv. Quinæ Sulph.* gr. iij; *Ferri Carb. Sacch.* gr. vij. M. *Fiant pil* ij; *Mittantur tales,* vi; *quarum sumat unam, ter in die. Intermittantur alia.* Yesterday three ounces of blood were taken from the arm, which Dr. W. Robertson was so good as to analyse. The results are as follows:—

Sp. Grav. of the Blood	1041·5
Sp. Grav. of the Serum	1026·5
Composition of 1000 *parts*—	
Fibrin	6
Serous Solids	72
Globules	67·5
Total Solids	145·5
Water	854·5

The analysis was conducted on nearly the same plan as that recommended by Dr. Christison, and subsequently adopted by Andral and Gavarret; but it is believed that the fibrin is more exactly estimated than by the process of the latter authorities. The sp. grav. of the blood and serum were very accurately taken, and the errors of manipulation cannot exceed .5 per 1000 in each constituent. The blood allowed to remain in a vessel for twenty-four hours presented a large and firm clot. Examined microscopically, it exhibited the same appearance as in Fig. 445, the rolls of coloured bodies not being so large. On adding acetic acid, the same kind of nuclei were observed; but they were now tinted of a deep yellow colour,

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Fig. 445. Appearance of a drop of blood in this case.
Fig. 446. The same after the addition of acetic acid. 250 *diam.*

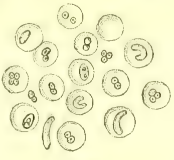

Fig. 447.

having apparently imbibed colouring matter dissolved in the serum. Some of the crescentic nuclei had become nearly straight. (Fig. 447.) *February 2d.*—Urine is observed to be loaded with lithates, and diarrhœa has returned. *Recipiat Pil. Plumbi opiat. unam ter in die, et Syrupi Iodidi Ferri guttas, quindecem ter in die ex aquâ. Illinatur Tinct. Iodini parti dolenti. Intermittantur alia. March* 24*th.*—During the last few weeks the hemorrhage from the nose and gums has continued to recur, and the ascites has not abated. He was ordered an astringent lotion for his gums. Since the 11th, Spongio-piline, with Tr. of Digitalis, has been applied to the abdomen, which apparently, in consequence, is less tense, while the pain has undoubtedly diminished. *April 8th.* — Diarrhœa again violent. Stools very fluid. He suffers also from cough, and there is harshness of respiratory murmurs, and prolonged expiration to be heard at the apices of both lungs. No dulness on percussion. *Recipiat Pil. Plumbi opiat. unam ter in die. April* 13*th.*—Pain in abdomen, and diarrhœa nearly gone. Sweats profusely at night. ℞ *Quinæ Sulph.* gr. xij ; *Acidi Sulph. dil.* ʒj ; *Syrupi Aurant.* ℥j ; *Aquæ font.* ℥v. M. *Ft. Mistura, cujus sumat,* ℥ss *ter in die. Repetantur Pil. Plumbi opiat. April* 23*d.*—The diarrhœa has ceased for the last eight days, but to-day has returned with considerable pain. *Intermittatur Mist. Quinæ Sulph.; Applicetur Emplastrum Opii* 4 X 4 *Abdomini; Recipiat Pil. Plumb. opiat.* ij *ter in die; Utatur Enem. Amyli cum Sol. Morph. statim, et Suppositorio Opii quotidie h. somni. May 5th.*—Has complained a good deal lately of nausea and vomiting, for which he has been ordered a draught every evening, with naphtha. He has also taken the squill and digitalis pill three times a-day, and had the tumour fomented with infusion of digitalis. Girth of abdomen at this period was thirty-seven inches. ℞ *Sp. Æth. Nitrici,* ℥iss ; *Aquæ Potassæ ; Sol. Mur. Morph.* ā ā, ʒij. M. *Sig. sumat.* ʒj *ex aqua ter in die. May* 7*th.*—Distension of abdomen from accumulation of fluid still increases, and pain continues. The urine presents an acid re-action, and is loaded with a copious sediment of lithate of ammonia, with a few colourless rhomboidal crystals of lithic acid. ℞ *Pulv. Scillæ,* ℈j ; *Pulv. Digitalis,* gr. x ; *Extr. Hyoscy.* ʒss ; *Cons. Rosarum,* q. s., *ut fiant pilulæ,* xx ; *Sig. sumat, unam ter in die. May* 13*th.*—Since last report diarrhœa has been very profuse, the bowels having been acted upon sometimes twenty times in the course of a night. Stools very loose but fœculent. Spongio-piline with digitalis to be discontinued, on account of its pressure causing uneasiness. He has taken the lead and opium pills four times a-day, as well as the starch injection, with Sol. Mur. Morph. at night. *Omittantur pil. Plumbi opiat.* ℞ *Tannini,* gr. xv ; *Pulv. Opii,* gr. vj ; *Cons. Rosarum, q. s., ut fiant pil.* vj ; *quarum sumat, unam sexta q. q. hora.* ℞ *Acidi Nitrici dil.; Syrupi,* ā ā, ʒss ; *Aquæ fontanæ,* ℥j. M. *et Sig. sumat,* ʒj *ter in die ex aqua. June* 1*st.*—Since last report the diarrhœa has continued, but is now much abated. Fluctuation in abdomen evidently diminished, There has been occasional slight epistaxis. Still sweats at night. Girth of abdomen at broadest part diminished to thirty-five and a half inches. *Intermit. Mist. Quinæ. June* 12*th.*—Has progressed favourably to this date; the tumour and ascites continue to diminish; and the diarrhœa and other symptoms having abated, the abdomen is now flaccid, and the skin is cracked similar to what is observed in a woman after pregnancy. To-day the diarrhœa has returned with some violence, with abdominal pain. *Habeant Pil. Tannini ut antea. June* 26*th.*—Diarrhœa still

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Fig. 447. The same after the blood has stood for twenty-four hours. 250 *diam.*

more diminished. There is a good deal of cough, with some expectoration, and harsh respiration is heard under clavicles, with increased vocal resonance. Has been taking ʒij of cod-liver oil three times a-day. His general strength is now greatly improved. He sits up the greater part of the day, and even walks about on the green. His amendment is so great that he is very anxious to return to his parents, who reside in Hull. *August 7th.*—Since last report the diarrhœa has returned at intervals, and still continues to be troublesome. On the whole, however, his health has improved; his appetite and strength have increased, and all ascites nearly disappeared. The cough and expectoration have ceased. The tumour measures transversely thirteen and a half inches, and longitudinally fifteen inches. From the lower border of ribs to inferior margin of tumour, ten inches. The circumference of the abdomen at the widest part (a little above the umbilicus), is thirty-four inches. He was now dimissed, having for some time expressed great impatience to return to his friends in Hull, and the farther progress of the case has been kindly communicated to me by Dr. Sandwith of that town. For some time he was in the Infirmary there, when the same symptoms were observed, more or less severe, that have been previously noticed. Then he lived at his parents' hovel, and finally he went into the Union Work-house, where he died at midnight, July 22, 1851. During all this time the abdominal swelling from the tumour continued, but he had no ascites; the diarrhœa was more or less urgent; the emaciation extreme, and the weakness gradually progressive up to the moment of dissolution.

Sectio Cadaveris.—Twelve hours after death.

This was performed by Mr. West, surgeon to the Union Work-house. The following report of the appearances observed was communicated to me by Dr. Sandwith:—

Extreme attenuation of the entire body.

Thorax.—The heart was small, very small, with a few patchy points on its surface. Its cavities contained a whitish imperfectly-formed lymph. The lungs had so perfectly healthy an appearance that we did not think it necessary to cut into them. There was no more effusion into either the pleural or peritoneal cavities than is quite natural. There was, however, an effusion, a little in excess, into the bag of the pericardium.

Abdomen.—Nothing unusual in the appearance of structure of the liver, save that the larger hepatic vessels were filled with small patches of coagulated black blood, side by side with immense flakes of a dirty white matter, like imperfectly formed lymph. The gall-bladder was filled with a glairy amber-coloured fluid, not much like bile. The liver weighed three pounds twelve ounces. On cutting into the organ, there oozed out from the smaller vessels a very thin watery blood. The spleen weighed three pounds fourteen ounces. Its surface was of a sky-blue colour, and dappled with numerous specks like cicatrices, most of them very small, but there were two much larger ones near the summit. It adhered here and there by bands of lymph to the peritoneal lining of the abdomen, and also to the peritoneal covering of the intestines. On the under surface of the organ there was a very small globular lobule, enveloped in organized lymph. A cord, run lengthwise along both surfaces of the spleen, measured twenty-four and a half inches. A cord, similarly applied across the organ, measured eighteen inches. The structure of the spleen was very firm,—indeed very much like that of liver. The omentum was utterly wasted. The mesenteric glands were most of them somewhat enlarged, pale, and with hard gritty matter in some of them. There were several enlarged glands at the caput coli in a state of congestion. Pale enlarged glands were also seen all along the sigmoid flexure of the colon. The kidneys were unusually shrunken and small, and weighed together six ounces. There was but little difference in the relative weight of each. Their structure was firm.

MICROSCOPIC EXAMINATION.—Next day I received from Dr. Sandwith a portion of the spleen, about four inches long, three inches deep, and one inch thick; with a nodule, the size of a large bullet, at the hylus of the organ. In structure, it was found to be simply hypertrophied, the fusiform cells of the trabeculæ presenting their normal character and arrangement, and the cells of the pulp unusually abundant. I also received portions of the clot taken from the heart, vena cava ascendens, and vena portæ. They presented exactly the same appearance as the clot in Case CLXXVI., divided into a dead-white purulent-looking layer, and a tolerably strong healthy-looking red one. The former, on microscopic examination, was almost wholly composed of colourless corpuscles, aggregated together by molecular fibres of fibrin; and the latter, though principally composed of coloured corpuscles, also contained many colourless ones. Two of the enlarged mesenteric glands which were sent, on section yielded a copious juice, that contained the same cells as are represented Fig. 443.

Commentary.—This boy was in the Infirmary upwards of six months, and the symptoms and entire progress of the case were watched with the greatest care. Unlike the former case, the spleen was the only organ enlarged, the liver presenting its normal dulness on percussion. The abdomen, however, was also the seat of ascitic distension. The smallest drop of blood taken from the boy's finger exhibited, during the whole of his residence in the Infirmary, the excess of colourless corpuscles, and the number of these underwent no perceptible increase or diminution, notwithstanding the varieties of treatment to which he was subjected. Owing to the theories which have been from time to time advanced regarding the functions of the two kinds of corpuscles found in the blood, and of the nature of its colouring matter, iron was the drug which seemed indicated. This boy had also lived in the fenny districts of Lincolnshire; and, although he denied ever having been affected with intermittent fever, it seemed very probable that the enlargement of the spleen was owing to this cause. I commenced the treatment, therefore, with the exhibition of iron and quinine. Other symptoms, however, became so urgent as to demand special attention, and the suspension of these remedies. I allude to the diarrhœa and dyspnœa, the former of which constituted the leading symptom of the disorder during the entire period he remained in the house. All kinds of astringents were given, with occasional temporary, but never with permanent, advantage. At one period he was so exhausted that I expected his death daily for a period of some weeks. He, however, again gained strength; and his bodily powers, except towards the termination of his residence in the house, were subject to considerable variations, evidently dependent on the amount of diarrhœa.

In April, pulmonary symptoms were added to his other complaints; and from the character these presented, as well as from the physical signs, a strong suspicion was formed that he laboured under phthisis pulmonalis. Under a tonic treatment, with cod-liver oil, assisted by the advance of summer, these symptoms diminished, and his general strength was so improved that, as is stated in the report, he insisted on going home. At the time of his discharge he was remarkably ill, greatly emaciated, and cachectic-looking, with an enormous abdomen,—so that it was only by comparison with what he had been, that he could be said to enjoy tolerable strength. It seems, however, that he reached Hull, by the steam-vessel, in safety, and lived nearly a twelvemonth longer, so that altogether he was under medical observation nearly eighteen months, the morbid condition of the blood existing during the whole of that time. After death the appearance and structure of the coagulated blood exactly resembled that presented in the former case, and there was the same hypertrophy of the spleen, and similar enlargement of the lymphatic glands, but not to so great an extent. The liver, however, was normal, and the lungs externally healthy, but not cut into.

Dr. Robertson was kind enough to analyse the blood for me in this case, and from the results he obtained, it appears that the fibrin was increased to about double its amount in healthy blood. The albumen and salts existed in their normal proportion. The globules were diminished to about one-half their proper amount, which deficiency was counterbalanced by an increase in the amount of water. This combination of increase in the amount of fibrin and diminution in the amount of corpuscles, indicates a condition of the blood which, so far as I am aware, is not peculiar to any other morbid condition of the economy.

CASE CLXXVIII.*—*Commencing Leucocythemia determined during Life—Enlarged Spleen and Liver—Ascites.*

HISTORY.—Thomas Welsh, a sailor, æt. 20—admitted into the clinical ward of the Royal Infirmary, September 22d, 1851. In June 1847, he first experienced a gnawing pain in the left side, and a hard swelling was distinctly felt in the splenic region. Shortly afterwards he was attacked with jaundice, and he became sensible of a swelling also on the right side of the abdomen. He says, that, owing to medical treatment, this latter swelling disappeared, and he regained his health. Since then he has occasionally had attacks of jaundice, and the abdomen has slowly enlarged, notwithstanding the internal use of large quantities of mercury and iodine.

SYMPTOMS ON ADMISSION.—On admission, his body generally is emaciated; the abdomen is considerably enlarged, measuring thirty-two inches round the most prominent part, which is two inches above the umbilicus; no fluid can be detected. The hepatic dulness measures vertically at its deepest part six inches, and its lower margin can be distinctly felt below the ribs, the left lobe sweeping backwards and upwards, and apparently coming in contact with the spleen. The splenic dulness measures vertically eight and a quarter inches; the anterior margin can be distinctly felt, with a notch in its centre, terminating on a level with the upper edge of the iliac bone. Bowels are generally loose; respiration is embarrassed and thoracic; no dulness on percussion over the chest; no cough, but occasional sibilation heard on auscultation; impulse of heart feeble, otherwise normal; pulse 78, small and weak. He has not increased in stature since he was sixteen, and has the external aspect of a boy of that age ; generative organs not developed ; urine healthy ; skin of a dingy yellowish colour. On microscopic examination of the blood, it was ascertained that the colourless and coloured corpuscles presented their normal relative number.

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* Reported by Mr. Wm. M. Calder, Clinical Clerk.

It is unnecessary to follow the progress of this case minutely. It will suffice to say, that the bowels every now and then became very loose ; he occasionally had epistaxis, and frequently more or less tenderness over various parts of the swollen abdomen. In October, he experienced a severe attack of acute laryngitis, from which he recovered in fifteen days. During the latter part of December ascites came on, the excretion of urine diminished in amount, and it was intensely loaded with lithates. The blood had been examined from time to time ; and on the 3d of January, a decided increase of the colourless corpuscles were observed. A diuretic treatment, by increasing the amount of urine, caused the ascites to diminish. But the number of colourless corpuscles gradually increased, so that, during the whole of February, considerable groups of these bodies could be seen between the rolls of coloured discs in a demonstration under the microscope. Latterly, his general strength became much diminished ; but his mother insisted on taking him home to Berwick, and he left the Infirmary, Feb. 27, 1852. I learnt from Dr. Johnson that he died two days after reaching Berwick. There was no post-mortem examination.

As soon as it was determined that the colourless corpuscles of the blood had decidedly increased, I requested Dr. W. Robertson to analyse the blood, which he did on the 7th of January, with the following results :—The blood coagulated firmly but little serum exuded from the coagulum, although it stood undisturbed for forty-eight hours. Surface of coagulum flat, and thinly coated with fibrin.

Density of blood.	1043·5
,, of serum	1027·

Composition of 1000 *parts.*

Fibrin		3·2
Serous solids,	Organic, 70·4 Inorganic, 10·3	80·7
Globules		82·3
	Total solids	166·2
	Water	833·8
		1000

Commentary.—Up to the occurrence of the present case, no example of leucocythemia had been met with in which the disease was seen to commence and progress. It will be observed that the spleen and liver had attained a very large size before the blood became affected. Nothing, indeed, can be more various than the mere bulk of one or more of the blood glands, and the leucocythemic condition of the blood. In several cases the spleen has been greatly hypertrophied, without any change in the blood whatever. The true explanation of these apparent discrepancies has yet to be discovered. The increase of colourless cells must commence at some particular time, but what that is has only been observed subsequently in one other case by Virchow.

The three previous cases, together with six others previously recorded in this work (Cases LXIV., LXIX., LXXV., LXXXIII., CVIII., and CXLVI.), are sufficient for the study of this important lesion of the blood. In my work on Leucocythemia, published in 1852, I have given thirty-seven cases more or less illustrative of the symptoms and pathology of the disease. Since then I have myself met with a considerable number of others, and many more have been published in the British, American, French, and German periodicals. Several other analyses of the blood also have been made. But very little advance seems to have occurred in our knowledge of the pathology and treatment of leucocythemia since I wrote in 1852, whilst all the facts which have been published confirm the conclusions which I then arrived at. A systematic account of the symptoms and progress of the disease, divided, as is usual among French writers, into three stages, has been compiled by M. Vidal,* chiefly from the facts contained in my work. It has been carefully done, although the basis as regards number of cases (only 32) is not sufficiently large.

Pathology and Treatment of Leucocythemia.

If the blood of living persons affected with this disease be examined microscopically (which is most readily accomplished by extracting a drop from the finger by pricking it with a needle, and placing it between glasses, under a power of 250 diameters linear), the coloured and colourless corpuscles are at first seen rolling confusedly together, and the excess in number of the latter is at once perceived. This, however, becomes more evident after a short time, when the coloured bodies are aggregated together in rolls, and leave clear spaces between them, which are more or less crowded with the colourless ones. Means are altogether wanting to enable us to determine with exactitude the relative proportion of the two kinds of corpuscles in different cases. In some the colourless corpuscles are only slightly increased beyond their usual number. In one case they are described as five times as numerous as those in health. They are also said in particular instances to be "greatly increased," "one-third as numerous," and "as numerous" as the coloured corpuscles. In all these statements there is nothing exact. Perhaps the best method of judging, is to regard the spaces or meshes left between the rolls or aggregations of yellow blood corpuscles. When these are completely filled up, the colourless bodies do not, in fact, amount to one-third of the coloured ones, on account of the large number of the latter which may exist in a small space, in the form of rouleaus. This will appear from counting them in Fig. 445, p. 820.

The size of the colourless corpuscles in the various cases given, differs considerably. Even when at first sight they appear to be of tolerably uniform size in any one case, it may be observed, when they are magnified highly and carefully measured, that some are twice the size of others, with all the intervening sizes between them. In some cases, though comparatively few in number, they are described as being three or four times larger than the coloured corpuscles, and in two cases they were in one about the same size, or somewhat smaller, Fig. 450, p. 828, and in the other of two sizes, one larger and the other decidedly smaller, Figs. 458, 459.

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* Gazette Hebdomadaire, Avril 4th, 1856.

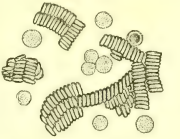

Fig. 448.

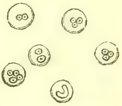

Fig. 449.

In the cases in which the blood was carefully examined after death, the same variations with regard to number and size of the colourless corpuscles were found to exist, as have just been referred to in blood drawn fresh from the finger. It was always observable, however, that they were most numerous in the clot; and when they existed in any number, as in Case CLXXVI., they communicated to the colourless coagulum a peculiar dull, whitish look, and rendered it more friable under pressure. When less numerous, portions of the colourless coagulum from the heart and large vessels might be seen to present a dull cream colour, easily distinguishable from the gelatinous and fibrous appearance of a healthy clot, and such altered portions always contained a large number of the colourless bodies.

The blood has been carefully examined chemically in several cases, from which it would appear that there is generally an excess of the fibrin and diminution of the corpuscles. The former ranges from 3 to 7 parts, and the latter from 100 to 49 parts in a thousand. In a well-recorded case by Dr. Wallace of Greenock, the blood was analysed by Dr. W. Robertson, and ascertained to contain in 1000 parts only 1·5 of fibrin, and 79· of corpuscles.*

The organs which have been found most uniformly diseased are the spleen, the liver, and lymphatic glands. The *spleen*, in the great majority of cases, has been enlarged, varying in weight from one to above nine pounds. The texture of the organ varied in different cases—in some being of unusual density, in others it was natural, and in a third class was more or less pulpy. In a few cases it contained yellowish masses, apparently a form of deposit, but in reality degenerated tissue. In most cases the cell and nuclear elements of the pulp were increased in amount, while the fibrous portion of the organ was apparently normal. Mere enlargement of the spleen, however, is not necessarily connected with leucocythemia, as I have met with many cases where it has been greatly hypertrophied without appreciable alteration of the blood.

* Glasgow Journal. April 1855.

Fig. 448. Colourless corpuscles slightly increased in number.
Fig. 449. The same after the addition of acetic acid. 250 *diam.*

It has appeared to me that in such instances the enlargement is more owing to congestion and fibrous hypertrophy, than to increase in cell elements. Next to the spleen, the *liver* is most commonly diseased. In the majority of cases it is simply hypertrophied, and in a few cirrhosed in various stages, or cancerous. The *lymphatic glands* are frequently enlarged. In most cases they are soft, presenting on section a granular whitish appearance, and yielding a copious turbid juice on pressure. In a few cases they were indurated, loaded with calcareous deposits, or infiltrated with cancerous or tubercular exudation. The *solitary and aggregated glands of Payer* have also been found to be hypertrophied in a few cases. The *thyroid body* was cancerous in one case, and evidently gave rise to leucocythemia (Case CXLVI.), and in certain cases of bronchocele, in which the blood was examined by Drs. Holland and Neale, a similar result has followed. Dr. Addison has also shown, in two of his cases of disease of the supra-renal capsules, that the blood was leucocythemic. Any other lesions occasionally found are evidently accidental, and in no way connected with that morbid state of the blood which we are now considering.

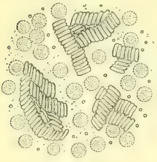
Fig. 450.

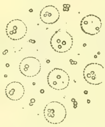
Fig. 451.

Relation existing between the Colourless and Coloured Corpuscles of the Blood.—Many physiologists have maintained that the coloured corpuscles are formed from the colourless ones ; and among those who hold this opinion, some have supposed that the latter bodies are directly transformed into the former (Paget*) ; whilst others contend, that, whilst such may be the case in fishes, reptiles, and birds, in mammals the coloured disc is merely the liberated nucleus of the colourless cell (Wharton Jones†). From the observations I have made on the blood corpuscles in cases of leucocythemia, the latter appears to me to be the more correct opinion.

The mode of transformation of the nucleus of the colourless cell into the flattened, biconcave, coloured disc, has not yet been described ; but, from the appearances I have observed, it would seem to take place in the following manner :—The colourless cell may frequently be seen, on the addition of acetic acid, to have a single round nucleus. But more commonly the nucleus is divided into two, each half having a distinct depression, presenting a shadowed spot in its centre. Occasionally, before the division takes place, the nucleus becomes oval, and sometimes is elongated, more or less bent, and even of a horse-shoe

* Kirke's Physiology, pp. 68, 69.

† Lond. Phil. Trans., 1846.

Fig. 450. Colourless corpuscles increased in number, and of small size.
Fig. 451. The same after the addition of acetic acid. 250 *diam.*

form. Not unfrequently the nucleus is divided into three or four granules, each having the central shadowed spot. All the appearances here figured have been frequently observed, although I have placed them in the presumed order of development.

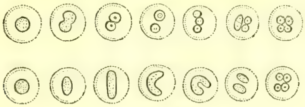

Fig. 452.

On one occasion the colourless bodies in the blood were of two distinct sizes. The smaller were evidently free nuclei, such as could be observed within the larger. (See Figs. 458 and 459, p. 833). On examining these latter, after the addition of acetic acid, all the appearances represented in the accompanying figure were observable, which I have again placed in the presumed order of development. On examining the lymphatic glands in this case, they were observed to contain the first body figured (*a*) in great numbers, associated with a few of the second one (*b*).

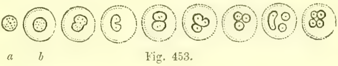

Fig. 453.

On several occasions the blood, when crowded with colourless corpuscles, was removed from the arm by venesection; and it was observed, that after standing twenty-four hours these variously-shaped nuclei had become of a straw colour, and exactly resembled the coloured discs in tint. It was immediately apparent that they had imbibed the colouring matter of the blood, leaving the cell which surrounded them perfectly transparent. (See Fig. 447, p. 821).

With a view of still further determining the transitional changes in the colourless cells, I performed the following experiment:—A rabbit was killed three hours after having eaten a meal. The thorax was rapidly opened, and a ligature placed round the pulmonary artery, to prevent the corpuscles coming from the thoracic duct passing into the lungs. The abdomen was then pressed gently for a few moments, to favour the flow of chyle, and then a ligature placed round the large vessels, and the heart removed by cutting above it. On examining the blood in the right ventricle, it presented an unusually large number of colourless cells, the nuclei of which, on the addition of acetic acid, exhibited all the transition stages figured Fig. 452. On examining

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Fig. 452. Colourless blood-cells observed in leucocythemia, showing the different appearances of the nuclei, placed in the presumed order of their development.

Fig. 453. Development of the nucleus in colourless blood-cells, in another case of leucocythemia. 500 *diam.*

the blood in the left ventricle, the colourless cells were normal in amount. This experiment was repeated with the same results.

I am therefore of opinion, with Valentin, Wharton Jones, and others, that the coloured blood corpuscles in mammals are free nuclei. But I do not consider, with the latter observer, that these nuclei in mammals should necessarily proceed so far in development as to be surrounded with a cell-wall,—in other words, the coloured disc is not always a further phase in the evolution of the colourless cell. On the contrary, I believe that the vast majority of the coloured blood discs simply reach the nuclear stage of growth before they join the circulation. Many of them, however, *do* proceed beyond this point in development, and may be seen to have cell-walls around them. Under such circumstances, the nuclei increase endogenously by a process of fissiparous division, in the manner formerly described, circulate in the blood within colourless cells, and on the solution of the cell-wall, also become coloured blood discs.

I have further examined the blood of birds, reptiles, and fishes, and have been enabled to observe transitional forms between the colourless and coloured cell, with even greater facility than I could in man. Indeed, the attention once directed to this point, scarcely a demonstration of blood can be made in these animals without seeing abundant evidence that the latter is a transformation from the former. In them, however, the colourless cell, at first round, enlarges gradually, becoming oval, and colour is added to it. The nuclei, also, after the addition of acetic acid, may be observed in these animals to be undergoing fissiparous multiplication within the cells. Thus all the appearances, Fig. 455, may readily be seen. Hence the same mode of endogenous development may take place in the blood-cells of all the vertebrated tribes of animals, the difference being, that whilst in birds, reptiles, and fishes, the corpuscles retain the form of nucleated cells, in mammals we find the majority of them to be free nuclei.

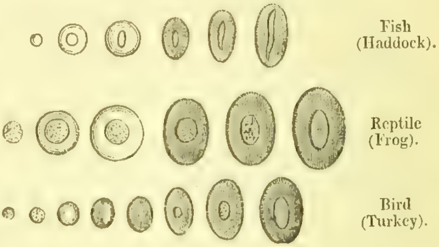

Fig. 454.

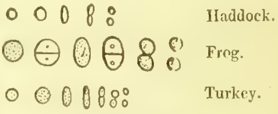

Fig. 455.

Origin of the Blood Corpuscles.—Hewson was the first who distinctly stated that the blood corpuscles were derived from the

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Fig. 454. Cells of various sizes, colourless and coloured, observed in the blood of a haddock, frog, and turkey, placed in the order of their supposed development. The three first bodies figured in each line are colourless.

Fig. 455. The nuclei of the blood-cells of the haddock, frog, and turkey, as seen after the addition of acetic acid. 450 *diam.*

lymphatic glands, yet few have adopted his opinions. Even Cruickshank, who wrote on the lymphatic system immediately after him, and was one of his contemporaries, says of the lymphatic fluid in which these corpuscles swim, "that we do not know the use of this fluid."* The correctness of Hewson's views is not even clearly admitted by his recent commentator, Mr. Gulliver, † has been denied by most physiologists in this country, and although Nasse, Wagner, Müller, and a few others, have contended that the lymph corpuscles in the blood are the same as those found in the lymphatic vessels, the mode of their origin and their functional importance is not even alluded to.

On examining the chyle in the lacteals ramifying below the serous coat of the intestine, it is found to consist of a multitude of minute fatty molecules, floating in a fluid (See Fig. 404, p. 677). These diminish in number as the chyle progresses towards the thoracic duct, where it is found to contain a number of free nuclei, mingled with a few others which are surrounded by a delicate cell-wall. The free nuclei may frequently be observed in mammals to present the same size and bi-concave discoid form of the coloured blood corpuscles. (Fig. 404, *a.*) Moreover, on the addition of water, they in like manner become globular, and, after the fluid has been allowed to evaporate a little, assume a puckered or crenated appearance. They only differ in their want of colour, and in not being partially soluble on the addition of acetic acid. (Figs. 404, *a*; 456, and 457.) On cutting into a well-formed lymphatic gland, and examining the juice which may be squeezed from it, it will be found to contain numerous free nuclei and nucleated cells. These are evidently the same bodies as are found in the lymph and chyle, and the latter closely resemble the colourless cells of the blood. The nucleus of these corpuscles also may frequently be observed to have undergone the fissiparous division formerly described, and to exhibit various stages of this process, in chyle taken from the thoracic duct. The opinion, therefore, held by many physiologists, that the colourless cells of the blood, and those of chyle or lymph, are the same, and consequently that in the highest class of animals they are not formed

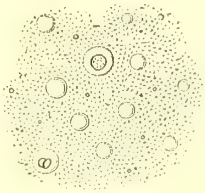

Fig. 456.

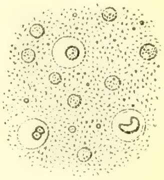

Fig. 457.

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* The Anatomy of the Absorbing Vessels of the Human Body. London, 4to, 1786. P. 73.

† The Works of William Hewson, F.R.S., edited by George Gulliver, F.R.S.L. Printed for the Sydenham Society. Note, p. 281.

Fig. 456. Fluid chyle, mingled with water, taken from the thoracic duct of a cat, three hours after it had been fed on milk.

Fig. 457. The same, after the addition of acetic acid. 250 *diam.*

in the blood itself, but before they are mixed with that fluid, seems to be well founded.

According to Henle, the molecules of the chyle unite together in order to form the nuclei, which are afterwards surrounded by an envelope.* These, he thinks, are delayed, and become more fully enveloped in the lymphatic glands.† Nasse ‡ also states, that he has seen aggregations of the chyle molecules and granular bodies, formed before they reach the lymphatic glands. On the other hand, it is certain that both nuclei and cells are most abundant in the glands themselves, and the cases of leucocythemia prove, that excess of colourless cells in the blood is not dependent upon an increase in the amount of chyle molecules, but is coincident with the enlargement of the spleen and other glandular organs. It is to these, therefore, we must attribute the principal influence in the formation of the colourless cells, and to them evidently we must look for the origin of the blood-corpuscles.

Hewson considered the lymphatic glandular system to consist of the spleen, thymus, and lymphatic glands. He believed that particles were produced in these organs which ultimately became the blood-corpuscles, and that the spleen especially served to secrete the colouring matter which surrounded them. This doctrine, though supported to a greater or less extent by some German authors, has been repudiated by all British physiologists up to this time. Mr. Simon § declares it to be impossible that the globules of the thymus can enter the lymphatic or blood-vessels, on account of the limitary membrane within which they are enclosed. But that they *do* find their way into those vessels was shewn by Hewson and Sir Astley Cooper, || who found them there ; and that the colourless corpuscles of the spleen and lymphatic glands enter the blood in large numbers, is proved by what occurs in leucocythemia, and by the great preponderance of these bodies at all times in splenic and portal blood.

But there are other glands which must be associated with those just mentioned as part of the lymphatic system, such as the thyroid body and supra-renal corpuscles. The pituitary and pineal glands have also been referred to the same class of organs by Oesterlen.¶ Without entering into lengthy anatomical details of each, it may be said that all these organs resemble one another in the following particulars :—

1. They consist of a fibrous stroma, enclosing spaces lined by a structureless membrane, which spaces are filled with colourless molecules, nuclei, and cells, in all stages of development.

2. The corpuscles of all these glands resemble one another,—the

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* Anatomie Générale, par Jourdain. Tom. i. p. 455.

† Anatomie Générale, par Jourdain. Tom. ii. p. 103.

‡ Wagner's Handworterbuch. Arts. Chylus and Lymphe.

§ On the Thymus Gland. P. 91.

|| Anatomy of the Thymus Gland. Pp. 15 and 43.

¶ Beiträge zur Physiologie des gesunden und kranken Organismus. Jena, 1843.

nuclei corresponding in size to the coloured blood-discs of mammals, and the cells corresponding to the colourless corpuscles of the blood. The very slight differences which do exist are at once explained by variations in the degree of development.

3. They have no excretory ducts, so that if the corpuscles formed in them are to leave the organs in which they originate, it can only be by the lymphatics or veins.

Now, it is certain that the blood of the splenic and portal veins, even in health, is always richer in colourless corpuscles than that of the systemic circulation.* It is also well known that in young animals the blood contains a larger number of these bodies than it does in their adult condition,—that is, when all these glands, including the thymus, thyroid, and supra-renal capsules, are fully developed and in a state of activity. In leucocythemia, we observe that when these glands are hypertrophied, and their corpuscular elements are multiplied, that the colourless corpuscles of the blood are increased in number. Two very carefully made observations, however, appear to me sufficient in themselves to determine the connection of these lymphatic glands with the cells of the blood. Thus in Case CXLVI., where the thyroid body was enlarged, its cells and their included nuclei were considerably smaller than usual, and it was ascertained that the colourless bodies in the blood and their nuclei were smaller also. (Figs. 405 and 406, p. 689, and Fig. 450, p. 828. In one case it was seen that the colourless corpuscles in the blood were of two distinct sizes, the smaller corresponding with the nuclei of the larger ones, and the lymphatic glands were found to be crowded with corpuscles also of two distinct sizes, exactly corresponding to those in the blood. (Figs. 458 and 459.) From these facts, we can have little doubt that the colourless corpuscles are formed in the lymphatic glands, and from thence find their way into the blood.

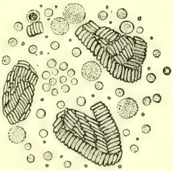
Fig. 458.

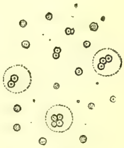
Fig. 459.

By what channel they effect this, whether by the lymphatics, the veins, or by both, it is very difficult to determine. The limitary membrane which surrounds the sacular glands is exceedingly delicate; indeed, so much so, that its existence has been denied by some observers. When distended, therefore, it may easily break, and the contents be poured into the pulp, surrounding stroma, or blood-vessels. Dr.

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* This well-known fact has been confirmed by the careful observations of Funke.—*Henle's Zeitschrift*, 1851, p. 172.

Fig. 458. Numerous naked nuclei of the colourless corpuscles in the blood.
Fig. 459. The same after the addition of acetic acid. 250 *diam.*

Sanders* has shown that the Malpighian sacs of the spleen are traversed by very large vessels, and Mr. Gray has attempted to demonstrate an intimate relation between the former and the splenic veins.† But it must be acknowledged, that notwithstanding the certainty which exists as to the connection between the closed lymphatic glands and the blood-vessels, and the passage of corpuscles from one to the other, the method by which this is accomplished has not yet been satisfactorily shown. I cannot help thinking, however, that there must be a direct venous communication.

Of late years physiologists have been in the habit of calling these glands the blood glands, although nothing more definite has been determined with regard to them than that they are in some way subservient to nutrition, especially during an early period of life. But if I have been successful in establishing that the corpuscular elements found in these organs are transformed into those of the blood, it will follow that the lymphatic glands secrete the blood corpuscles in the same manner as the testes secrete the spermatozoa, the mammæ the globules of the milk, or the salivary and gastric glands the cells of the saliva and gastric juice.

With regard to the exact mode in which the corpuscles are formed in the glands, two theories exist, both of which are dependent upon numerous facts and observations closely connected with the origin of all vital structures, and indeed of organization itself. One is, that they are thrown off, in the form of epithelium, from the membrane which surrounds them; the other, that they originate in an organic fluid, by the production of molecules, the successive development and aggregation of which constitute the higher formations.‡ I have long been of opinion that the latter theory is the more consistent with known facts, and certainly all that I have seen during repeated investigations into the structure of the various lymphatic glands, is in harmony with it. Nowhere have I seen the nuclei and cells of these glands attached to, or apparently given off from, a membrane, still less from supposed fixed germs, but everywhere pervading a molecular fluid within the closed sacs. But, however produced, whether from molecules or fixed germs, it is here they are formed, and are subsequently thrown into the torrent of the circulation,—there, colour is added to them, and they become blood corpuscles. Multitudes of free nuclei in this way join the blood, and are at once converted into coloured blood discs.§ The cells, which in health are comparatively few in number, circulate for a time as colourless corpuscles, but after a certain period their walls dissolve, when their included nuclei also become coloured discs. In leucocythemia the colourless cells are increased, whilst the free nuclei are diminished in number. The consequence is, that the former are developed at the expense of the latter, and as they do not become coloured on reaching the lungs, the formation of red blood is more or less checked. In the three inferior vertebrate tribes, the entire cell becomes oval, and assumes colour.

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* Report of Physiological Society of Edinburgh for January 31st, 1852. Monthly Journal for February 1852.

† On the Spleen, pp. 233-4. 1854.

‡ Report of Physiological Society of Edinburgh for January 31st, 1852. Monthly Journal for April 1852.

§ In making this statement, I am aware of the possibility of these nuclei being surrounded by a cell-wall so fine as not to be detected by the best instruments. But having confirmed the observations made originally with Oberhaeuser's microscope, by means of an excellent lens by Ross, of one-eighth of an inch focus, with the most careful attention to the management of the light, it is my conviction that the great majority of these bodies possess no cell-walls.

All that is known of the development of the blood corpuscles, on the one hand, and of the blood glands on the other, supports the theory now brought forward. The primitive production of blood in the embryo occurs in the interior of cells in the vascular layer of the germinal membrane, which cells are afterwards transformed into vessels. At this period the colourless cells are very abundant, and their nuclei may be seen to undergo the fissiparous mode of multiplication formerly described; the cells themselves also in this fœtal condition, multiply by division.* In the invertebrate tribes, there are no lymphatic vessels or glands. In fact there is only one circulation, which has been shown by Milne Edwards to consist of a series of tubes, analogous to arteries or veins, which communicate by means of lacunæ that surround viscera. But the circulating fluid contains two distinct kinds of corpuscles, which Mr. Wharton Jones has shown to be different phases of each other, and to correspond with the colourless and coloured corpuscles of fishes, reptiles, and birds. In fishes a lymphatic system exists separately, and in them we first observe a pituitary body, supra-renal capsules, and a spleen. In reptiles there are added the thymus and thyroid glands, and in both these classes of animals the communications between the blood-vessels and lymphatics are numerous and direct. In birds we first observe, in addition, glands on the lymphatics of the neck, but not on the lacteals, and there are two thoracic ducts. In the mammalia, the highest development of the lymphatic glandular system exists, including mesenteric and lymphatic glands, a spleen, thymus, thyroid, pineal, and pituitary bodies, and supra-renal capsules. Thus, we observe a correspondence between the amount of corpuscular elements in the blood, and the extent and complexity of the lymphatic glandular system. They are comparatively few and colourless in most of the invertebrata, and in such animals, as stated by Wagner, should be considered as analogous to those of lymph. They become more numerous and coloured, with the appearance of a spleen and supra-renal capsules, in fishes. Both in fishes and reptiles, however, the colourless cells are numerous. In birds the coloured cells are smaller, but still nucleated; and in mammals the coloured bodies are free nuclei, and are even much more abundant.

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* These changes are well figured by Fahrner. — *De Globulorum Sanguinis*, &c. Turici, 1845.

Again, it has been supposed that the coloured cannot be formed from the colourless bodies of the chyle,—1st, because the former can be seen of all sizes in the blood itself; 2d, because, on examining the blood of fœtal animals, no intermediate stages of growth can be seen between them; and, 3d, because, on the addition of acetic acid, while the coloured bodies are nearly dissolved, the naked nuclei of the chyle are not. Hence it is said they are of different chemical composition.

With regard to the first argument, derived from variations in size of the coloured particles, it may be said that, granting the fact, nuclei may also be observed both free and within cells, of all sizes, so that they correspond perfectly with the coloured corpuscles of the blood. Besides, in different cases of leucocythemia, although the colourless cells have been seen to be smaller, of the same size, somewhat larger, and even twice as large as the coloured bodies, their nuclei may always be observed to correspond exactly with the different phases of the latter. With regard to the second argument, advanced by those who have not succeeded in detecting transition forms in embryonal blood, I am persuaded that this arises from the circumstance, that attention is directed to the colourless cells, instead of to their nuclei. For my own part, I have never failed to observe all the changes previously described, not only in fœtal, but even in adult blood. As to the third objection, in reference to dissimilarity of chemical composition, it must be remembered that when the chyle corpuscles enter the circulation by the left jugular or sub-clavian vein, they pass immediately through the pulmonary artery into the lungs, come in contact with oxygen, and undergo chemical changes, with which we are as yet unacquainted Some physiologists have supposed that colour is added to them before they join the pulmonary circulation, because yellow corpuscles have been seen in the upper extremity of the thoracic duct. In all such observations, however, they have been necessarily exposed to the atmosphere; and I have frequently confirmed the observation of Emmert, viz., that the coagulum of chyle, at first colourless, becomes pinkish-red in contact with air. On this point I offer no opinion, believing that neither chemistry nor physiology has as yet communicated to us any exact information with regard to the when or how hæmatin is produced. But whatever the changes may be which occur in the lymph corpuscles on their passage into the lungs, to those organs we must attribute the alteration in their chemical constitution, as they are colourless and insoluble in the lymphatic glands and in chyle, but coloured and partially soluble in the torrent of the circulation.

Moleschott* having found the colourless cells increase in the blood of the frog after excision of the liver, supposes that it is in the latter organ colour is added to the blood. In man we have seen that the structural diseases of the liver are frequently associated with enlargement of the spleen in leucocythemia, but in other cases the liver has been quite natural (Case CLXXVII.) even in very severe examples of the blood disease. Besides, it is difficult to understand how chemically so important a function should be performed by this organ.

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* Müller's Archives. Hept. 1, 1853.

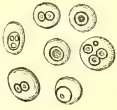
Fig. 460.

Ultimate destination of the blood-corpuscles.—There may frequently be observed in the spleen of all animals, groups of blood corpuscles, surrounded by an albuminous deposit closely resembling a cell-wall. This fact has been differently interpreted. Gerlach is of opinion that they are new blood corpuscles forming within a mother cell,*—whilst Kölliker† and Ecker‡ maintain that they are old ones, which, having fulfilled their functions in the circulation, go to the spleen, and are there dissolved. These large cells, containing several coloured nuclei, I believe to be cells of the lymphatic glands, which, under especial circumstances, assume power of increased development, with endogenous multiplication of nuclei. They are common not only in the spleen, but in the mesenteric and other lymphatic glands, especially when hypertrophied from neighbouring irritation, the result of inflammatory or cancerous exudations, and especially in typhoid fever. A similar increased power of development may occasionally be observed in the epithelial cells of the pulmonary air vesicles in certain pneumonias; in those covering the choroid plexus in hydrocephalus; in those of the epidermis in epithelial cancer; and in pus. On the other hand, that extravasated blood corpuscles may assemble together in groups, and subsequently be surrounded by an albuminous deposit closely resembling a cell-wall, is a fact of great pathological importance.§ It is true they closely resemble the lymph cells, with multiplying nuclei, but may, I think, be separated from them by possessing more colour. I have seen them not only in the spleen, but in other glands, and especially in the brain, following spontaneous and artificial sanguineous extravasations (See Figs. 275, 276, p. 221). But surely it will not be maintained that the normal function of the organs in which these accidental formations occur, is to dissolve the blood corpuscles. Besides, from the numerous facts which have been referred to, I trust it has been made apparent that the spleen is much more probably a blood-forming than a blood-destroying gland.

The view which seems to me most consistent with facts is, that the blood corpuscles are dissolved in the liquor sanguinis, and with the

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* Handbuch der Allgemeine und Speciellen Gewebelehre, etc., s. 53.

† Mikroskopische Anatomie, etc. 2 Band, s. 282.

‡ Wagner's Handwörterbuch. Art. Blukgefassdrüsen.

§ See Dr. Sanderson on the Metamorphosis of Coloured Blood Corpuscles, etc. Monthly Journal for September and December 1851.

Fig. 460. Cells with single and multiple nuclei; many of the latter in colour and form exactly resemble blood globules. From the human spleen. 250 *diam.*

effete matter absorbed from the tissues by the lymphatics, constitute blood fibrin. (See p. 107.)

These facts are sufficient to prove that fibrin is in no way necessary to cell development and formation of the tissues. On the other hand, all those circumstances that cause exhaustion of the textures, or increase the amount of absorption from these, augment the amount of fibrin, as after inflammatory or other exudations, starvation, violent fatigue, pregnancy, and frequent bleeding or hæmorrhage. Both Nasse and Zimmermann found it far more abundant in lymphatic, weak persons, than in those who were strong and vigorous. Again, while there is little fibrin in the chyle of the lacteals, it exists in great quantity in the lymph of the lymphatics, as determined by Nasse in man, and Müller in frogs.* It follows that the primary digestion must transform fibrin into albumen, rather than the latter into the former; and such is very probably also the result of the secondary digestion. How otherwise could so small a quantity, as from one and a half to three parts in a thousand, exist in healthy blood—an amount altogether disproportionate to what would be required, did this constituent build up the tissues as such? It appears, therefore, probable that the fibrin results partly from a solution of blood corpuscles, and partly from the effete matters of the tissues. Hence why absorption of exudations, or of the textures from exhausting causes, will produce increase of this constituent in the blood, as well as anything that favours the disintegrating process of the blood corpuscles themselves.

It has been maintained by some that fibrin is secreted by the blood corpuscles. Dr. Carpenter supposed this to be the especial function of the colourless cells, † and Mr. Wharton Jones of the coloured nuclei.‡ But there are facts proving that fibrin must have a double origin as I have stated—one in the solution of both kinds of corpuscles, another from the tissues, of which its increase during inflammation and in rheumatism are examples, although in these morbid states, increase in the colourless or coloured corpuscles is certainly not essential. Hence fibrin must be referred to a process of disintegration, rather than to one of evolution,—but even in this capacity, may serve to produce higher elaboration of that complex fluid, the blood.

From the various facts which have been stated, I think we may conclude:—

1. That the blood corpuscles of vertebrate animals are originally formed in the lymphatic glandular system, and that the great majority of them, on joining the circulation, become coloured in a manner that is as yet unexplained. Hence the blood may be considered as a secretion from the lymphatic glands, although in the higher animals that secretion only becomes fully formed after it has received colour by exposure to oxygen in the lungs.

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* Zur Analysis und Synthesis des pseudoplastischen Processe. Berlin, 1844. P. 19.

† British and Foreign Medical Review, vol. xv. pp. 272, 273.

‡ Ibid. vol. xiv. p. 597.

2. That, in mammalia, the lymphatic glandular system is composed of the spleen, thymus, thyroid, supra-renal, pituitary, pineal, and lymphatic glands.

3. That, in fishes, reptiles, and birds, the coloured blood corpuscles are nucleated cells, originating in these glands; but that, in mammals, they are free nuclei, sometimes derived as such from the glands; at others, developed within colourless cells.

4. That, in certain hypertrophies of the lymphatic glands in man, their cell elements are multiplied to an unusual extent, and under such circumstances find their way into the blood, and constitute an increase in the number of its colourless cells. A corresponding diminution in the formation of free nuclei, and consequently of coloured corpuscles, must also occur. This is leucocythemia.

Since the above views were published by me in 1851, they have been confirmed by observations of various kinds. Thus Holland* and Neale† have shown that in many cases of bronchocele the blood is leucocythemic. In the only two cases of supra-renal disease described by Addison in which the blood was examined, the colourless cells were increased in number. In a case of dysentery, with thickening of the mucous membrane of the small intestine, I found leucocythemia. (Case LXXV.)

Attempts have been made to divide leucocythemia into varieties. Thus, Virchow speaks of a splenic and a lymphatic variety. But in this manner we might make further distinctions of a thyroid, a supra-renal, an intestinal, and a mesenteric variety, according as disease in these organs occasioned the blood lesion. Nay more, we might speak of an hypertrophic, a tubercular, a cancerous, a dysenteric, and an anæmic form, according as we find the blood glands simply increased in size, loaded with tubercle or cancer, and associated with dysentery or anæmia. These distinctions I believe to be of no advantage, either in a scientific or practical point of view. The different blood glands contain elements which, when locally increased in number, find their way into the blood, to constitute leucocythemia. They form one system of organs, and any kind of disease in them may structurally affect the blood. What appears to me, however, now a desideratum in research, is to determine why, in some cases, the blood should, and in others should not, be leucocythemic, when these glands are diseased; and why simple anæmia, as was first shown by Remak, should increase the number of colourless cells in the blood? In one case examined by me in the autumn of 1852, and the characteristic blood in which I had the pleasure of showing to Dr. Hannover of Copenhagen and to Dr. Sharpey of London, I unexpectedly ascertained it might be diagnostic. It was the case of a woman concerning whom a difference of opinion existed between two distinguished obstetricians, the one declaring a tumour in the left flank to be splenic, and the other that it was ovarian. I showed it to be splenic, by demonstrating the blood, which was crowded with colourless cells.

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* Journal of Microscopical Science, vol. i. p. 176.

† Medical Times and Gazette, vol. viii. p. 430.

With regard to treatment, nothing that I have yet tried has appeared to be of the slightest service in well-marked cases with distinct glandular enlargements. Iron, quinine, chloride of potassium, hydriodate of potass, and a variety of medicines given internally, with tincture of iodine applied externally, have been of no avail. The chief indications in advanced cases, however, will be found to be furnished by accidental complications, the most common of which are diarrhœa and epistaxis, which require astringents, combined with tonics, nutrients, and stimulants, to support the vital powers.*

Discovery of Leucocythemia.

Professor Kölliker of Wurzburg, (in Month. Journ. of Med. Science, Oct. 1854), laid before the English medical public the history of the discovery of Leucocythemia *as it is understood in Germany,* from the representations of Professor Virchow. The following is my reply:—

It is said by Professor Kölliker that the first observations on this subject occur in the year 1845, and take their origin from a case of disease by Dr. Craigie. Now, the fact is, that Dr. Craigie's case occurred in 1841; and it is admitted by Dr. Craigie himself that it would not have been published even four years afterwards but for the occurrence of mine. He says, "I kept it unpublished from the period at which it took place; and it is published at this time, chiefly because of the occurrence of a case in many, if not in all, respects similar to another physician in the

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* The first eleven of the following cases of Leucocythemia have been under my care since the publication of my work in 1852. To these Dr. Haldane has kindly added seven others, the bodies of which he has examined in the Pathological Theatre of the Royal Infirmary since November 1853—making eighteen in all. I might have swelled the list greatly by adding numerous cases obligingly communicated to me by professional friends:—

Name.	Age.	Degree.	Liver.	Spleen.	Abdominal Glands.	Remarks.
1. Tho. Christie.	15	Advanced.	Not	examined after	death.	
2.†Wm. Baillie...	43	Advanced.	3 lb. 10 oz.	2 lb. 4 oz.	Little enlarged.	
3. Patrick Flood	13	Well marked.	Dis	missed from the	house, and did not	return.
4. Jn. Gaffney...	16	Moderate.	6 lb. 14 oz.	22 oz.	Twice natl. size.	
5. Chas. Rennie.	19	Well marked.	4 lb. 7 oz.	2 lb. 14 oz.	Enlarged.	
6. J. M'Arthur..	25	Moderate.	3 lb. 5 oz.	6 oz.	Highlytubercular.	Tubercular peritonitis.
7. Eliz. Pollock..	56	Advanced.	Not	examined after	death.	
8. Wm. Dods.....	23	Slight.	3 lb. 12 oz.	5 oz.	Greatly enlarged.	Cancer in various organs.
9. T. Crease......	28	Moderate.	2 lb. 8 oz.	6 oz.	Mucous coat of ileum thickened.	Cancer in lung.
10. Eliz. Barker...	17	Slight.	2 lb. 7 oz.	Natural.	Enlarged.	Tubercular peritonitis.
11. Janet Young..	50	Moderate.	2 lb.	Natural.	Not mentioned.	Aneurism—Waxy Kidneys.
12. John Young...	27	Well marked.	Natural.	14 oz. dense.	Not mentioned.	Glanders? Cerebral hemorrhage.
13. G. Harper. ...	60	Advanced.	Do.	8 lb. with deposit.	Little enlarged.	
14. Ber. Collins...	35	Well marked.	5 lb. 10 oz.	27 oz.	Not enlarged.	Tubercle in lungs—Pneumonia.
15. D. Cockfield...	32	Slight.	6 lb. 8 oz.	22 oz. deposit.	Little enlarged.	Bright's disease.
16. J. M'Gregor...	32	Do.	5 lb. 11 oz.	16 oz.	Much enlarged.	Melæna.
17. Jer. Brown....	29	Advanced.	5 lb. 9 oz.	3 lb. 13 oz.	Enlarged.	Acute tuberculosis.
18. John Short ...	50	Well marked.	4 lb.	8 oz. dense.	Not enlarged.	Bright's disease.

† The blood in this case, when subsequently under the care of Dr. Halliday Douglas, was analysed by Mr. Kemp, who found—water, 864·67; albumen, 71.25; fibrin, 5·35; corpuscles, 58·97.

same hospital, led me to anticipate similar results, and went far to confirm my conclusions deduced from the first case." —*Edin. Med. and Surg. Journ.*, vol. lxiv. p. 402.

Professor Kölliker takes great pains to show that Dr. Craigie and myself held the same opinions as to these cases, and that in mine, which followed his, "nothing further was elucidated." On the other hand, he says Professor Virchow was the first to point out that "no signs of inflammation in the veins were any where discoverable," etc. Now, exactly the contrary of this is the fact. Dr. Craigie put forth two possibilities as to the cause of the blood disorder. 1*st.* He says, "It is barely possible that some *inflammatory action* had taken place in the tributary or constituent veins of the mesenteric trunks; and that the *purulent matter and lymph thus formed* had been conveyed into their interior with the blood, and thence into the *vena cava*, heart, and vessels of the brain." 2*d.* He says, "Another opinion occurred to me, however, as more probable, and which various circumstances in the case induced me to regard as the most correct. Considering that the spleen had been for some time, that is, for several weeks, in a state of *chronic inflammation*, and taking into account the large vessels with which this organ is connected to other organs, it appeared to me that this *inflammatory process*, which had been continuing so long without abating, subsiding, or being subdued, was at length beginning to give rise to the formation of lymph and purulent matter, and that these substances, as they were formed, were immediately taken into the veins, and thus circulating with the blood, gave rise to the peculiar assemblage of symptoms which the patient presented during the few days preceding his death." (P. 409.) From these extracts it must be clear that Dr. Craigie considered the blood disease as secondary, and dependent on the absorption of pus from an inflammatory lesion either in the mesenteric veins or spleen.

The view taken up by myself was wholly different, viz., that the blood disease was primary, originating in that fluid itself, altogether independent of local inflammation, and especially unconnected with inflammation of the veins. This will appear from the following extracts from my paper:—"In the present state of our knowledge, then, as regards this subject, the following case seems to me particularly valuable, as it will serve to demonstrate the existence of true pus formed universally within the vascular system, *independent of any local purulent collection from which it could be derived.*" (Pp. 413, 414.) And again, "Pus has long been considered as one, if not the most characteristic, proof of proceeding acute inflammation. But in the case before us, what part was recently inflamed? *There was none.* Piorry and others have spoken of an inflammation of the blood, a true hematitis; and certainly if we can imagine such a lesion, the present must be an instance of it. But it would require no laboured argument to show, *that such a view is entirely opposed to all we know of the phenomena of inflammation.*" (P. 421.) From these passages it must be clear that I then separated the state of the blood from preexisting inflammation in any of the tissues, which had not been done by any preceding author. I especially distinguished it from pyæmia as it was then generally understood. Thereby I established a new blood-disease—one of a primary nature. I carefully described all the facts, which Virchow has only subsequently confirmed. I spent three entire days investigating the histological character of all the tissues in the body, and in demonstrating the important fact, that the colourless corpuscles in the blood, which I minutely described, were unconnected with inflammation. Notwithstanding all this, Professor Virchow has pertinaciously endeavoured to persuade his countrymen that I regarded the case as one of ordinary pyæmia or purulent absorption; and Professor Kölliker, in his communication, says of these laborious researches, that "nothing further was elucidated" beyond what had previously been determined by Craigie and Reid.

Here, it should be observed, that Dr. Craigie was no histologist, and had never employed the microscope in the investigation of disease. To argue, then, that the discovery of this condition of the blood—a discovery altogether dependent on histological research—was made by him, seems absurd in the extreme. But it may be maintained that this part of the inquiry was carried out by Dr. John Reid, because he stated in the register, kept by him as pathologist of the Infirmary, that the blood "contained globules of purulent matter and lymph." The few words now quoted constitute literally the whole of Dr. Reid's observations on the matter. They would have been buried in oblivion, if I myself had not found them in the register of dissections, pointed them out to Dr. Craigie, and indicated their importance. I have frequently conversed with Dr. Reid himself on the subject, who had forgotten the circumstance of having examined the blood microscopically in Dr. Craigie's case, or of having made a note of it. Certainly he paid no more attention to it, or in any way thought it more important than a host of other notes he made, which still exist in the pathological register, and in which some future controversialist may doubtless find many similar discoveries, as yet unknown. At all events, it is certain that neither Dr. Craigie nor Dr. Reid ever imagined to themselves that the "globules of purulent matter and lymph" seen by the latter originated independent of purulent absorption, or ever dreamed of claiming for themselves the discovery of leucocythemia. Who then did make it? Certainly not Virchow, who with Kölliker, in order to depreciate the value of my observations, claims it for these gentlemen. And if none of the three made it, the inference undoubtedly is, that the discovery belongs to me.

What, then, it may be asked, does Professor Kölliker claim for his colleague? It cannot be the discovery of the facts, or of the existence in large numbers, of colourless corpuscles in the blood, independent of inflammation. All the histological facts—the white appearance of the blood (white blood), its independence of inflammation, and its separation from all previously known pathological conditions—were minutely described by me in the paper of the 1st of October 1845, and their accuracy has been everywhere confirmed. (See Case CLXXVI.) Surely this description of *facts* never before published, and of their connection with a new blood-disease, constitutes the discovery. On the other hand, Virchow's short and comparatively imperfect histological description of a case of white blood (the white appearance of the blood being the chief point he dwelt upon) was printed in the second number for the following November, although from the admission of Professor Kölliker, as to the practice which prevails in Germany, the actual period of its publication may have been much later. Hence all that can be claimed for Virchow amounts to this, that he puts forth *an opinion* regarding these facts different from mine, but the possibility of which I clearly indicated. For having described the peculiarities of the blood—the white coagulum, its structural characters, the colourless corpuscles, their relation to the red ones, and the absence of the inflammatory appearances in every tissue, not excepting the veins—the questions remained, What are these corpuscles? How are they produced? In reply, I remarked, that "with regard to the colourless corpuscles of the blood, *we know of no instance* where they existed in the amount, or ever presented the appearance described." From this passage Professor Kölliker draws the inference that I denied that these bodies were the colourless corpuscles of the blood. But I need scarcely point out that the passage does not fairly bear that construction. On the other hand, it clearly shows that the possibility of their being these colourless corpuscles was fully entertained. At that time the whole subject was histologically new; and having shown that the cells observed closely resembled those of pus in their structural and chemical characters, I said so, and concluded they were pus corpuscles. But having also demonstrated that they could not have been derived from any inflamed tissue, it only remained to be concluded that these bodies were formed in the blood system itself, constituting a primary suppuration of the blood. Here, I contend, was the real discovery, which was at that time quite new, and remains up to this hour, in my belief, a correct generalization.

Whilst Professor Kölliker seems to attach no importance whatever to my careful histological examination of the blood and of the tissues, and wholly disregards the fact I was at so much pains to establish, that the colourless corpuscles I described were not dependent on inflammation, he thinks it of the greatest importance that Virchow should have stated that these corpuscles were not those of pus. To me it has always seemed of little importance by what name these bodies were designated, so long as the facts regarding them were described with exactitude. It cannot be denied that I first discovered and described them, and pointed out their origin in the blood itself. What histological difference there can be between pus cells independent of inflammation, originating spontaneously in the blood, and the colourless corpuscles of that fluid, I am at a loss to imagine. Yet this is the only distinction which Virchow made. But what are pus corpuscles but cells presenting certain physical characters originating in an exuded blood-plasma? and what are the colourless corpuscles of the blood but similar cells originating in a plasma contained in the blood glands? I have yet to learn that there is any true histological difference between them; I believe still that the only distinction is, that the same corpuscles originate in blood-plasma, sometimes outside, and sometimes within the blood system. If so, the controversy raised by Virchow, and maintained by Kölliker, is wholly one of words. Here I may mention, that, acting on the persuasion that the two kinds of corpuscles, hitherto separated, are really identical, I opposed the generalization of Mr. Henry Lee, which set forth that pus brought in contact with living blood caused its coagulation. In conjunction with the late Professor Barlow of the Veterinary College, I injected considerable quantities of pus into the veins of an ass, in order to determine this point. I thus increased the colourless cells in the blood of the animal without producing any coagulation or inflammation whatever.—(*Monthly Journal*, January and March 1853, pp. 80 and 272, 273). Moreover, it may be questioned, and indeed it has been questioned in a communication which I received from Professor Gluge of Brussels, and in an article by Dr. Radcliffe (*Half-yearly Abstract of the Medical Sciences*, vol. xvi. p. 295), whether this distinction can have any real foundation. Rokitansky still maintains that the colourless corpuscles of the blood in leucocythemia are truly those of pus, and Vidal, after a series of observations directed to this very point, has come to the conclusion that the colourless corpuscles of the blood, those of pus and of mucus, are the same (*Gazette Hebdomadaire, Avril 11th*, 1856). If so, the pretended discovery of Virchow sinks into nothing, as it is not founded on fact, but simply on opinion.

As to the subsequent progress of this inquiry, I have only to express my astonishment at the statement made by Professor Kölliker, that in 1851, in the *Monthly Journal*, and that in 1852, in my separate work, I made no allusion to my former views, and did not take the slightest notice of the labours of Virchow. It is most untrue. My views regarding this disease have always been the same, but never such as Virchow and Kölliker have represented them; and so far from denying the labours of the former pathologist, I have fully set them forth, and quoted all his facts and observations. I always have and still continue to estimate highly the value of the facts he has contributed in connection with this important subject. But what he has accomplished does not entitle him to the original discovery of leucocythemia, or to the merit of giving it a place in pathology.

Careful investigation into this subject will, I am satisfied, convince the candid inquirer that the discovery of leucocythemia and the subsequent progress of ideas regarding its nature may be divided into three epochs or stages as follows:—

1. Professor Bennett.— *October* 1, 1845.	Discovery of a new morbid condition of the blood, consisting of multitudes of colourless corpuscles, resembling those of pus, associated with hypertrophy of the spleen and liver, and presenting after death peculiar white coagula. Shown to be unconnected with inflammation in any of the tissues, and especially unconnected with phlebitis. Attributed to the development of the corpuscles in the blood itself.
2. Professor Virchow.— *Series of papers from the 2d or 3d week of November* 1845 *to* 1847.	Confirmation of the preceding facts, but the corpuscles said to be an increase in the colourless cells of the blood. New cases, and especially one of great value, in which a similar condition of the blood was associated with enlargement of the lymphatic glands without hypertrophy of the spleen. Origin of the colourless cells attributed to the lymph glands; proposed name of leukhemia or white blood.
3. Professor Bennett.— *Series of Papers*, 1851. *and separate work*, 1852. Rl. 8vo, Edinr.	Systematic view of the whole subject. Additional facts and cases, with chemical analyses of the blood. Doctrine that the lymphatic and other ductless glands secrete the blood; proposed name of leucocythemia or white-cell blood, and the relation of this disease to other pathological conditions, and to practical medicine pointed out.

From this view of the case, it will be seen that although I claim the discovery of leucocythemia, and have given it the correct scientific name it bears, I am far from undervaluing or wishing to hide Professor Virchow's contributions to its pathology—whereas he, in order to make it appear that the origin as well as development of the whole subject are due to himself, has not hesitated to give, and circulate in Germany, the most erroneous and partial accounts of my facts and views.

Since the above statement was published, Professor Virchow has continued not only to repeat his former errors, but to assert that his case, published at least six weeks after mine, was, in fact, the first one. Thus in his "Gezammelte Abhandlungen," dated 1856, he says, p. 155—"*About* the same time that my case was published, two other cases were made known in Edinburgh," etc. He then goes on to detail them, observing, "Case 1, *observed by me;* Case 2, by David Craigie; Case 3, by John Hughes Bennett." Thus distinctly claiming for himself priority in observation. In the same manner, Vogel, in giving a report in Canstatts' Jahrbücher of the progress of Medical Science in 1852, part 3, on special and local pathology, puts, 1st, Virchow's paper from the Archives, vol. v.; 2dly, my papers in the Monthly Journal; and 3dly, my separate work. Yet what are the dates of these publications? My papers appeared in 1851, with the first chemical analyses of the blood made by Dr. W. Robertson. My separate work is dated March 1852, and Virchow's paper, with the chemical analyses by Professor Scherer, is dated August 1852!

The French writers on this subject have declared the term leukhemia to be faulty, and adopted that of leucocythemia. Leudet,[*] Vidal,[†] and Schnepf[‡] have followed the representations of Virchow, and, in a professed historical sketch, have stated that his and my cases appeared *about* the same time. As if six weeks was not more than a sufficient period for the Edin. Med. and Surg. Journal to reach Berlin, and to be placed on the library table of the Royal Library there, where it might have been seen by such readers of English medical literature, as Virchow undoubtedly is, long before the latter published his note, in the 2d November number of Froriep's Notizen. Schnepf (who is evidently unacquainted with my writings, and has only seen the short resumé I presented to the Biological Society of Paris in 1851, at the request of my friend M. Lebert), represents Virchow's case as occurring in March, and mine in October 1845. That is, he gives to Virchow's case the date at which mine was investigated in Edinburgh, five months before the latter occurred! The real dates are as follows:—

		Observed.	Published.
1st Case	Prof. Bennett	March 19th, 1845	October 1st, 1845.
2d Case	Prof. Virchow	August 1st, 1845	Novem. 2d week, 1845.
3d Case	Dr. Fuller	Decem. 31st, 1845	July, 1846.

Dr. Craigie's case must obviously be placed amongst those that occurred long before the discovery of leucocythemia was made, although on looking back upon it one can have no doubt that it was an example of the disease similar to a very excellent one published by Duplay, in the Archives Gén. de Médecine, 2d series, vol. xxxvi. p. 223, 1834; or the one which occurred to M. Barth in 1836, but was only published in 1856 by Vidal, when the subject was fully known.

CHLOROSIS AND ANÆMIA.

CASE CLXXIX.[§]—*Chlorosis and Anæmia—Cured.*

HISTORY.—Lilias Ross, æt. 19, servant in a hotel—admitted October 13th, 1856. She states that menstruation commenced in her sixteenth year, and continued to recur regularly till about a year ago. It then ceased, and she experienced debility, palpitation with pain under the left breast, defective appetite, and discomfort after meals. On leaving off work for six weeks, her health was restored, and the catamenia returned. She again went into service, and in four months the symptoms came back. She dates the present indisposition from the last menstrual period, four weeks ago.

[*] Gazette Hebdomadaire, 27 Juillet 1855.

[†] *Idem,* 15 Fevrier 1856.

[‡] Gazette Médicale de Paris, 5 Avril 1856.

[§] Reported by Mr. John Glen, Clinical Clerk.

Symptoms on Admission.—She seems in every respect well formed, not emaciated, but the skin is blanched, and of a slight greenish waxy tint. Over the chest and mammæ are a few patches of pityriasis versicolor, of a faint yellowish tint. She complains of occasional palpitation. On examination, the heart's impulse is in its normal position, and is at present of natural force. There is a soft but distinct blowing murmur with the first sound, loud at the base of the organ, but audible in the course of the aorta and large arteries. Over the carotids above the clavicle, a loud double blowing is audible, which, on pressure with the stethoscope, becomes a continuous humming-top sound. Pulse 100, soft. Tongue pale and flabby, appetite defective, food causes a painful sense of weight with distension in the stomach, no vomiting or flatulence, occasional sense of constriction in the throat, bowels costive, having for some weeks been opened only by laxatives. She has frequent giddiness, rarely headache, often darkness before the eyes, no spinal irritation, but great weakness over the loins, and such a sense of fatigue, with heaviness in the limbs, that she has great difficulty in walking. The catamenia have not appeared at the usual period on this last occasion. They have never been profuse or accompanied by pain. Urine healthy. Respiratory system normal. ℞ *Pil. Rhœi. Comp.* xij. Two to be taken every third night. ℞ *Ferri Citratis*, ʒj ; *Syrupi Aurantii, et Tr. Aurantii*, ā ā, ℥j ; *Infusi Columb.* ℥iv. M. *One tablespoonful to be taken three times a-day.*

Progress of the Case.—*October 25th.*—Is improved in strength, and can walk about the ward. The heart's palpitations are easily excited. Sometimes the murmur over the carotids in the neck is of a hoarse double character, at others continuous and very loud. To encourage a return of the catamenia, *four leeches ordered to be applied to the vulva, followed by a warm hip bath. November 10th.*—Is gaining strength slowly on the whole, but experiences alternations in this respect—palpitations and pain under left mamma being sometimes severe, at others absent. The soft blowing murmur at base of heart has disappeared, but the humming-top sound over cervical vessels continues. *November 25th.*—Blowing murmur at base of heart occasionally returns after exertion only. Sounds in neck less intense. No catamenia, although pediluvia, mustard poultices to the feet and other means have been employed at the supposed menstrual period. *December 10th.*—Has continued to take the chalybeate mixture all this time, and is now strong and vigorous. A faint sound only is audible over the vessels in the neck, after exertion. Appearance healthy, appetite good, bowels regular, no headache, nor nervous pain. With the exception of amenorrhœa, may be said to be quite well. Advised to go to the country for a little. Dismissed.

Commentary.—This was a well-marked case of anæmia and chlorosis, cured by iron, tonics, and rest. Such cases, in young women, are exceedingly common in the female wards of the Infirmary, especially among the class of servants. Great discussion has occurred as to the cause of the murmurs in the heart and large blood vessels. Some maintaining their seat to be the arteries, others the veins. The arguments of Dr. Ogier Ward, who first maintained the seat of the anæmic murmur to be in the jugular vein, are generally considered to be well founded. They are—1st, The *continuous* murmur is often coexistent with distinct carotid impulse, which alternates with repose ; 2d, It may be interrupted by pressing the vein *above* the stethoscope ; 3d, The two murmurs may be occasionally heard by employing a small-ended stethoscope, and shifting it slightly to the right or left ; 4th, It is increased by any cause which accelerates the flow of blood through the jugular vein, as during the act of inspiration, and when in the upright posture—it is diminished when there is an impediment to the venous circulation, as during expiration, the recumbent posture, and when the veins are swollen or turgid. Andral endeavoured to show that the constancy of the murmur is proportionate to the diminution of corpuscles, and that it became continuous if the blood globules fell below 80 parts in 1000. But Dr. Davies has pointed out that the murmur is not peculiar to anæmic persons, but often exists in individuals of robust health. He attributes it to friction on the inner surface of the veins, which is more or less audible according to the readiness with which their parietes take up vibrations, and the facility with which the latter are conducted to the outer surface of the body. Hence their frequency in children and young persons, and in the quick ventricular contraction with thin blood, of the chlorotic girl, and, on the other hand, their absence during the slower circulation, and thickened condition of the tissues in adult and aged persons. At the same time there can be little doubt that the interrupted blowing at the base of the heart, over the aorta and carotids, which is synchronous with the impulse, is often arterial and not venous. Indeed, the separation of anæmic arterial and venous murmurs is frequently a matter of excessive difficulty. Sometimes also, as has been well pointed out by Stokes, they are associated with organic disease, which adds to the complexity, and occasions great difficulty in forming a correct diagnosis.

The coloured corpuscles of the blood may be increased or diminished in quantity, constituting *Polycythæmia* and *Oligocythæmia* (Vogel). These changes may be absolute or relative. In the former case, the corpuscles are uniformly increased or diminished throughout the body generally; in the latter, this depends upon the amount of water which, by being less or more, alters the proportion of the corpuscles to the other constituents of the blood. Becquerel drew a distinction between anæmia and chlorosis, which, on the whole, is well founded. Thus, anæmia is caused by a variety of circumstances which impoverish the blood, such as long continued hemorrhage, exhaustive discharges, starvation, chronic diseases, certain poisons, etc.; chlorosis is induced by obscure causes connected with the nervous system, generally originating in disturbed uterine functions. In anæmia, the alteration of the blood is constant and pathognomonic; in chlorosis, it is only one of the phenomena, and not always present. In both diseases the physical signs may be alike, but in anæmia the functional sound is more often in the arteries, in chlorosis in the veins. In anæmia there is constant relation between intensity of symptoms and poverty of the blood. This is not the case in chlorosis. The duration and progress of anæmia is dependent on the causes which produce it, but chlorosis is very variable, and no such evident connection is visible. The treatment of anæmia has two indications—1st, To suppress the exhausting causes which occasion it; and, 2dly, By means of wine, proper nutrients, and regulated exercise, to improve the quality of the blood. In chlorosis, iron is the chief remedy, which should be conjoined with efforts to regulate the menstrual function.

ICHORÆMIA OR (SO-CALLED) PYÆMIA.

CASE CLXXX.*—*Acute Articular Rheumatism—Multiple Abscesses in the Joints, in the Muscles, within the Cranium, etc.*

HISTORY.—James Lockie, æt. 17, a rope-spinner—admitted December 1, 1854. Ten days ago, when spinning ropes in the open air, he was exposed to more than usual cold and wet. Next day rigors and other febrile symptoms appeared, followed by pain, redness and swelling of the right elbow joints. During the four following days the right wrist and ankle joints were also affected, together with both knee joints. Four days before admission the heart's action became very violent, and leeches were applied to the precordial region. The pain and swelling of the joints have continued since.

SYMPTOMS ON ADMISSION.—On admission he complained of great pain in the right wrist, ankle, and left shoulder joints, which were swollen, immovable, doughy to the feel, tender to the touch, with the integuments over them erythematous. From the left shoulder joint, the swelling extended into the axilla and down the inside of the arm. Pulse 130, full and strong; heart's impulse violent, but no blowing murmur. The tongue coated with brown in the centre and white at the edges; no appetite; great thirst; skin hot and dry; urine turbid from excess of lithates; bowels open; no headache, and the other functions normal. *Fiat venesectio ad* ℥xiv. ℞ *Potassæ Nitratis* ℥ss, *Aquæ* ℥vj *solve.* ℥ss *to be taken in half a tumblerful of water every four hours—warm saturnine lotions to the inflamed joints.*

PROGRESS OF THE CASE.—*December 2d.*—Little change, pulse 120, more soft, blood not buffed, but it was drawn from a small orifice. *Dec. 4th.*—Pain in all the joints greatly diminished, the swelling, however, continues. A blister has formed over the external malleolus of right ankle—complains of soreness in the heels. Pulse 100, of good strength. No blowing murmur with the heart's sounds. Took ℥j of castor oil last night (the bowels having been constipated), which has acted copiously. Tongue dry, and covered with a brown fur. Febrile symptoms continue, with profuse diaphoresis. On the 6*th December* the blister over the malleolus of right ankle burst, and gave issue to a quantity of pus. Distinct fluctuation existed over the right wrist and dorsum of the hand, which was opened by an incision, and also gave exit to a considerable quantity of pus. *To omit the nitrate of potash.* On the 8*th*, complained of pain in the back of the neck, and a bed sore was seen to be forming over the sacrum. *To be placed on the water bed.* From this time the pulse, which ranged from 110 to 140, lost its fulness, and became much more weak; the skin assumed a dirty yellowish or tawny hue, the typhoid febrile symptoms continued, with dry tongue and sordes, and numerous abscesses formed in the joints and various parts of the body, several of which, as soon as they became soft, were opened. A very large abscess formed over the occiput, which was opened on the 18*th*, and another over the manubrium of the sternum, extending up the left side of the neck, which was opened on the 24*th*. The skin over the heels, trochanter of the right hip, and the sacrum, sloughed, notwithstanding every care taken to prevent it. On the 26*th*, the whole of the right lower extremity was swollen, œdematous, and white, resembling in aspect phlegmasia dolens; there was laborious breathing, and great prostration. Low muttering delirium, and involuntary evacuations supervened, and he sank on the morning of the 27*th*. The treatment had latterly been directed by generous diet and stimuli, to support his strength, relieve pressure on depending parts, and to dressing his sores.

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* Reported by Mr. A. W. More, Clinical Clerk.

Sectio Cadaveris.—Seventy-two hours after death.

Body greatly emaciated; a fistulous opening, the size of a shilling, existed immediately in front of the left sterno-clavicular articulation. Other sores, varying in size from half an inch to three inches in diameter, and laying bare the bones, existed over the right elbow, ankle, both hip joints, right knee, and sacrum.

HEAD.—The integument covering the occiput was separated from the skull, infiltrated with putrid pus, a great quantity of which had been evacuated by openings previously made. On removing the calvarium, an abscess, containing thick yellow pus, existed between the bone and dura mater, about the centre of the occipital bone. The bone externally was somewhat carious, but internally it was healthy. No communication could be traced between the external and internal abscesses. *Brain* healthy.

CHEST.—On removing the heart and aorta, a fluctuating oval swelling, about $\frac{3}{4}$ inch in its long diameter, was situated outside the aorta, about an inch from the aortic valves, which was distended with yellow purulent matter. The posterior portions of both inferior lobes of the lungs were condensed. On section they presented a reddish purple colour, the air vesicles filled with a soft sanguineous exudation and readily sinking in water. *Heart* healthy.

ABDOMEN.—Kidneys slightly enlarged—one section presenting a whitish mottled appearance, without great atrophy of the secreting, or encroachment on the tubular substance. Other abdominal organs healthy.

JOINTS.—The left sterno-clavicular articulation was carious and disarticulated, with matter burrowing to considerable depths in the surrounding soft textures. The right shoulder, left elbow, right wrist, both hip joints, both knees, and both ankle joints, were filled with dirty purulent looking matter, which, in several instances, more especially in the left elbow and hip joints, had infiltrated itself more than half way down the fore arm and thigh. The various articular cartilages presented all stages of abrasion, softening, and ulceration, whilst the osseous textures below exhibited a curious and blackened necrosed condition. The base of the ulcer over the sacrum consisted of necrosed bone, and over the right elbow, right hip, and knee joints, bone was exposed and necrosed.

THE VEINS were carefully examined, especially in the right inguinal region, and with the sinuses at the base of the brain, were everywhere found healthy, and free from coagula; indeed, the blood was everywhere unusually fluid—even in the heart presenting small, dark, and soft coagula.

MICROSCOPIC EXAMINATION.—The pus consisted of molecular and granular matter with debris of disintegrated pus cells, with the exception of the abscess within the cranium, the pus of which was normal. The cartilage covering the joints was in some places healthy, but in others its cells were enlarged, filled with secondary cells, and not unfrequently with fatty granules. Around the articulations of the joints were laminæ of chronic exudation, consisting of dense amorphous matter, principally composed of minute molecules. The blood was carefully examined, and everywhere found normal.

Commentary.—This was a case of what is commonly called pyæmia, and is not uncommon from the result of mechanical injuries, or suppurative diseases. I believe it to be very rare, however, following attacks of acute rheumatism, such as all the symptoms and the history of this case prove it to have been. The lad was healthy and in pursuit of his ordinary occupation when, after exposure to cold and wet, he was seized with the usual symptoms of rheumatic fever, including violent action of the heart, and on this supervened suppuration in almost all the joints, with numerous abscesses, accompanied by a low typhoid fever, under the effects of which he sank. Dr. Watson has recorded two cases singularly like it, but in them the constitutional disease was preceded by ottorrhœa and abscess in the ear,* to which he theoretically ascribes the origin of the disease. In the present case there was no primary abscess, no evidence of a pre-existing collection of pus before the attack of rheumatism, and I think there can be little doubt that the constitutional state of the blood, whatever it may be, was dependent on the abscesses which resulted from the acute inflammation of the joints.

This morbid condition, so much dreaded by surgeons and obstetricians, in which typhoid fever comes on after severe accidents or parturition, accompanied with purulent infiltration, or multiple abscesses, in one or more organs, has received different explanations. The various observations and experiments performed with a view of elucidating this subject in modern times have led to the four following theories:—1. That this condition is owing to an admixture of the blood with pus (pyohemia of Piorry), and that the pus corpuscles being larger than the coloured ones of blood, are arrested in the minute capillaries, and give rise to secondary abscesses. 2. That it is owing to the presence of any irritating body, which cannot be eliminated from the economy, producing capillary phlebitis. 3. That it is dependent on a property possessed by pus of coagulating the blood. 4. That it is caused by the presence of a peculiar poison which contaminates the system. All these views have been maintained with much ingenuity, and they are all supported by experimental and clinical researches. A knowledge of the circumstances previously detailed concerning leucocythemia will enable us to criticise these doctrines from a new point of view.

1. With regard to the first theory, it must, I think, be granted by all those who have examined the blood in leucocythemia, or will study the figures I have given illustrative of that disease, that no difference whatever can be detected between the colourless cells of the blood and those of pus. Their general appearance, size, structure, and behaviour, on the addition of re-agents, are identical,—indeed so much so, that in the first case I observed in 1845, I could not resist the conclusion that the blood was crowded with pus cells. It follows,

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* Practice of Physic, vol. i. p. 372, 3d edition.

that all explanations of purulent infection founded upon the mechanical impaction of these bodies in the minute capillaries must be erroneous. Some of these colourless corpuscles have been observed much larger than ordinary pus corpuscles. In one instance, many of them were twice as large, and although this may in some measure be owing to endosmosis of serum, there can be little doubt that they must have exceeded the usual size of pus cells. In Case CLXXVI., also, it was observed that several of the colourless cells were larger than the average, and yet the circulation went on, and every drop of the patient's blood contained hundreds of these bodies. The first theory, then, is no longer tenable.

Neither does there seem to be anything peculiar in the substance of good and laudable pus, which necessarily leads it to poison the blood ; for it is a matter of common observation, that large abscesses are absorbed and eliminated without occasioning so-called purulent infection. In all such cases, the pus corpuscles must, in the first instance, be disintegrated and reduced to a fluid condition ; still the matter or substance of which they were composed passes into the blood. Hence, while leucocythemia proves that corpuscles, identical in form, size, structure, and chemical composition with those of pus, may float in the blood and circulate innocuously, the well-known fact of the absorption of abscesses demonstrates, that pus, when healthy, is not associated with any poisonous properties. If, then, the fever and other marked symptoms are owing to pus, it must be pus possessing properties wholly different from that which is generally called good or laudable.

2. The second explanation was advanced by Cruveilhier, who, on injecting mercury, ink, and other substances into the blood of a living animal, found that the multiple abscesses were formed wherever these accumulated. Hence, impaction of some substances, and consequent local inflammations, may lead to abscesses ; but that such is not the necessary result of admixture of pus with the blood, is proved not only by the previous observations, but by numerous experiments of Lebert* and Sédillot,† in which the animals recovered.

3. The third doctrine was advanced by Mr. Henry Lee,‡ and resulted from observing that when pus was mingled with recently drawn blood, it coagulated more rapidly and more firmly than under ordinary circumstances. This observation he connected with the well-known fact, that phlebitis was often associated with coagula causing obstruction of the veins. Now it is worthy of remark, that in decided cases of leucocythemia the blood is more highly coagulable than when drawn from the arm, and after death it often presents firm coagula, filling the vessels, as in Case CLXXVI. Figs. 437 to 439 illustrate these colourless coagula,

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* Physiologie Pathologique, tom. i. p. 313.

† De l'Infection Purulente, p. 73, *et seq.*

‡ On the Origin of Inflammation of the Veins. London, 1850.

as observed in different parts of the body. The same occurred in Case CLXXVII.; and yet, during the life of the patient, the blood, loaded with the colourless corpuscles, rolled through the vessels without impediment or the formation of coagula. It does not follow, then, that because dead pus is mingled with recently-drawn blood about to coagulate, that therefore it should induce coagulation of living blood in the vessels of an animal. Indeed, numerous experiments by Lebert and Sédillot show that such does not take place; for although, in some cases death followed, in others the animals lived, and the pus corpuscles were dissolved.[*] Hence, although the fact to a certain extent must be admitted, that when pus is mingled with blood the coagulum formed is more firm, it by no means follows that it produces coagulation of *living blood*, and is the cause of phlebitis or purulent infection.

4. The fourth theory seems to have been maintained by A. Boyer[†] and Bonnet,[‡] who believed good pus to be innocuous, and the bad effects occasionally produced to depend on its becoming putrid, or being otherwise altered. This view was also more or less supported

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[*] In 1852, to determine this point more definitely, I performed, with the late Professor Barlow of the Veterinary College, the following experiments:—

Experiment 1.—The saphena vein of an ass was exposed, and a tube introduced confined by a ligature. Fresh and healthy pus was then slowly injected *upwards* towards the heart, from a syringe holding an ounce. A slight obstruction was now perceived, and the vein above the ligature could be seen to be somewhat swollen. This swelling, on being felt, was very soft; and on pressing the vein from below upwards, the mixed blood and pus was readily pushed before the finger, when all obstruction to the passage of pus from the syringe was removed. The syringe was again filled, and another ounce of pus injected, without occasioning any further local effects. The animal was then allowed to get up, and exhibited no change in its normal condition whatever.

Experiment 2.— The same ass was the subject of this experiment a fortnight later, having been perfectly well in the interval. Six inches of the jugular vein in the neck were carefully dissected and exposed; and a minute aperture was then made in the upper end of the exposed vein, and the bent tube of the syringe introduced without a ligature. The coats of the vein were so transparent that the flowing blood could be seen through them. An ounce of fresh and perfectly healthy pus was then slowly injected *downwards* towards the heart, and, owing to the transparency of the vein, the yellow opaque fluid was seen to join the blood, to continue a few moments running side by side with the crimson current, until at length the vein became full of pus. On removing the syringe to obtain a fresh supply, the blood from above could be seen to join the pus, to continue side by side with that fluid, presenting a streaked red and white appearance, without any coagulation, until all the pus was carried forwards and downwards towards the heart, and the vein was again full of blood. Another syringeful of pus was then injected, which could once more be seen first to flow with the blood, then, as its quantity increased, to take the place of the blood, and then, on the syringe being exhausted, to receive blood from above; the two mixing together, and continuing their course without coagulating, until once more the vein contained nothing but blood. The wound was now closed, and the animal allowed to rise, which he did without apparent suffering. He presented no unusual symptoms whatever during the next four days, when he was killed, and the parts carefully dissected. The vein was pervious, presented no thickening, nor cording or abscesses, and the external wound was nearly healed.

This experiment appeared to be so decisive, and so clearly opposed to the idea that the contact or mixture of pus and blood necessarily induced coagulation in a living animal, that it was thought unnecessary to repeat it. With regard to the slight coagulability apparently occasioned in the first experiment, it was attributed partly to injecting contrary to gravity, whereby the mixed pus and blood were allowed to fall backwards and remain stationary, while the ligature prevented any flow of blood from being continued. No such phenomenon was observed in the second experiment, where no ligature was employed, and where the effect of gravity was avoided by injecting downwards. In a communication, however, received from Dr. Henry Lee, I was informed that no ligature was employed by him.

The second experiment performed by the committee was in its nature the same as the seventh and eighth experiments of Dr. Henry Lee, and yet none of the appearances observed by that gentleman resulted. There was no fulness or cording of the vein, no acceleration of respiration or constitutional symptoms; and after death no coagulation of the blood, no obliteration of the vein, nor local inflammation. What are the circumstances which occasioned this difference, I am not prepared to say; but the positive fact of having introduced the pus on two separate occasions, as recorded in Experiment 2, of having seen the pus mix with the blood and the blood with the pus, through the transparent vein, without producing coagulation, is sufficient to negative the general proposition, that whenever pus is mingled with blood in a living animal, coagulation of the latter fluid is the invariable result.

[†] Gazette Méd. de Paris. p. 193. 1834.

[‡] Ibid. p. 593. 1837. Both cited by Sédillot, Op. cit. p. 55.

by Darcet* and Bérard,† who, in order to explain the undoubted effects of putrid substances when injected into the veins, separated pyohemia from purulent infection. But as pus corpuscles do not alone cause the symptoms, it is certainly more probable that, in all cases, there must be a toxic effect associated with pus when it proves mortal. Dr. Millington ‡ has shown, in repeating Mr. Lee's experiments, that putrid fluids prevent coagulation of the blood, and that the coagulum caused by the addition of pus is more perfect the fresher the purulent matter is. This fact is opposed to the idea, that multiple abscesses are induced by the coagulation, but corresponds with what is observed after death in cases of purulent infection. When, therefore, we consider the typhoid nature of the symptoms so similar to that of certain animal poisons; the multiple abscesses so analogous to what occurs in glanders, plague, syphilis, variola, etc.; and the undoubted fact, that the blood may be loaded with corpuscles in every respect identical with pus cells, without causing these symptoms, the irresistible conclusion is, that these effects are not owing to pyohemia, but to an animal poison.

This view has been opposed on the ground that fresh pus, to all appearance healthy and without odour, has yet caused the death of animals. But what sensible property distinguishes the pus of the vaccine from the small-pox pustule, and either of these from healthy pus? And yet how different their effects when introduced into the blood! The subject of animal poisons is certainly obscure; but we advance our knowledge by attributing purulent infection to this cause, rather than in considering it to be the mere mixture of pus with the blood, or a so-called pyohemia.

This doctrine, which was first clearly put forth in my work on "Leucocythemia" in 1852, seems now to be generally adopted, and the condition of the blood has been called septicæmia (Vogel), and ichorhæmia (Virchow). The so-called pus corpuscles, which by some have been seen in the blood, are identical with the colourless cells of that fluid, and if in excess, constitute white cell blood. Virchow himself, who has claimed so much for simply denying that leucocythemia can be pyhæmia, is obliged to admit, when writing on the latter subject,§ that the diagnosis between pus and colourless cells, of the blood is very difficult, and frequently impossible. In truth they are the same, and in the majority of cases, what has been called pyæmia is not dependent on pus cells mingling with the blood, but on a matter derived from some kinds of pus, which poisons the blood, and occasions the secondary phenomena.

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* Thèse Inaugurale. Paris, 1842.

† Dictionnaire de Méd., tom. 26. 1842.

‡ Monthly Journal. November 1851. P. 486.

§ Gesammelte Abhandlungen. P. 653.

GLUCOHÆMIA.

CASE CLXXXI.*—*Diabetes Mellitus.*

HISTORY. — Allan M'Clemont, æt. 32, labourer — admitted 7th June 1852. About three weeks ago, on recovering from a general rheumatic attack, he found himself much reduced in strength, and somewhat emaciated. He experienced great thirst, and passed a large quantity of urine. These symptoms have rapidly increased.

SYMPTOMS ON ADMISSION.—On admission, tongue moist and clean, appetite increased, thirst excessive, bowels rather costive, skin dry, urine very pale and slightly turbid. On heating a portion of the urine with an equal portion of Aq. Potassæ, a deep brown colour is produced. He has passed during the last 24 hours, 380 oz., spec. grav. 1030, having drank 460 oz. of water in that time. Other functions performed normally. His weight was 11 stone 8 lbs. *Ordered pills of Aloes and Ipecacuan, and a mixture of Inf. Quassiæ and Tr. Aromat.*

PROGRESS OF THE CASE.—On the *10th June*, he was ordered the following diet: 3 cakes made of bran, butter, and milk, weighing half a pound; 3 eggs; 4 oz. steak for breakfast, 12 for dinner, 4 for supper; 1 cabbage; 3 bottles of soda water; 8 oz. of lime water; 3 oz. of wine. To have a warm bath every third night. On *15th June* the amount of urine passed was diminished to 120 oz. in the day, of density 1036, and he drank during that time 150 oz. His weight was 11 stone. On the 22d, he was ordered 4 oz. of steak additional, and another bran cake. From this time the amount of urine fluctuated from 160 to 190 oz. daily; but on the *5th July* it was reduced to 150 oz., spec. grav. 1034, and his drink was 167 oz. He then weighed 11 stone 2 lbs.; but being wearied of the treatment, he insisted on going out on the 6th.

CASE CLXXXII.†—*Diabetes Mellitus—Phthisis Pulmonalis—Vomica on Right Side—Death.*

HISTORY.—Robert Fallow, a tailor, æt. 24—admitted into the clinical ward, July 8th, 1851. Last December, when in America, was attacked with bilious fever, which continued ten weeks. Shortly afterwards, he observed that the quantity of urine he passed was greatly increased, and that his thirst was excessive. Cough appeared six weeks ago, followed by purulent expectoration; and the skin, which had previously been remarkably dry, was now covered with copious sweat during the night.

SYMPTOMS ON ADMISSION.—Percussion elicits no decided difference of sound on either side of the chest, but there is a much greater degree of resistance under the right clavicle than under the left. On auscultation, cavernous respiration is very distinct under the right clavicle, but the sounds are dry. The vocal resonance, also, is greatly increased in the same situation, and has somewhat of a metallic character. Under the left clavicle, inspiration is harsh, and expiration prolonged. On the left side, posteriorly and inferiorly, the inspiration is everywhere harsh, with occasional cooing rales and prolongation of the expiration. The expectoration is copious, muco-purulent, and of brownish tint, without distinct traces of blood. Cough severe. Tongue furred and dry, coated near the base. Appetite good. Thirst insatiable. Sour-sweet taste in the mouth. Pulse 108, small and weak. Has voided 70 oz. of urine during the last twelve hours. The addition of liq. potassæ, followed by heat, throws down a reddish-brown sediment. Skin soft and moist.

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* Reported by Mr. J. L. Brown, Clinical Clerk.

† Reported by Mr. W. M. Calder, Clinical Clerk.

Progress of the Case.—On the *11th of July*, gurgling was heard under the right clavicle. On the *20th*, there was complete loss of appetite, and repugnance to food. The urine varied since last report, from 170 to 230 oz., voided in the 24 hours. Profuse sweating at night. Mucous rales heard over the whole anterior surface of chest on the right side. Vocal resonance still metallic under right clavicle, with cracked-pot sound on percussion. *August 4th.*—The amount of urine passed now varies from 100 to 150 oz. during the twenty-four hours. Weakness and emaciation have greatly increased; sweating and loss of appetite continue. Died at 7 P.M.

As to treatment, he was ordered a diet, consisting at first of eggs, boiled meat, and stale bread and milk; pills of opium and hyoscyamus at night, and cod-liver oil internally. An expectorant mixture, afterwards combined with antispasmodics, was ordered to relieve the cough.

Permission to examine the body could not be obtained.

Commentary.—Phthisis pulmonalis is a very common complication of diabetes in persons under 30—a circumstance which appears to me to support the pathological views formerly given, as to the great importance which should be attached to derangement of the nutritive functions, as a cause of the tubercular disease. An animal and oleaginous diet is indicated in both disorders; which, however, when present in the same individual, may easily be supposed to constitute a hopeless form of malady.

The excretion of sugar in large quantities by the kidney has for a lengthened period excited the attention of pathologists, and given rise to abundant speculation. It having been shown by Mr. Macgregor of Glasgow, that sugar was formed in the stomach from the digestion of food, while that principle was subsequently detected in the blood by the same observer, as well as by Ambrosiani, Maitland, and Percy—the view of Rollo was, on the whole, considered the correct one, and the treatment he proposed has been, in its main features, followed by subsequent practitioners. This theory supposed that the sugar formed in the stomach and alimentary canal, from the starchy and saccharine principles of the food, instead of being rapidly converted into other compounds, as it was supposed to be by Prout, was absorbed into the blood, and excreted by the kidneys. The treatment based upon this theory was, therefore, directed to keeping up nutrition from substances incapable of being converted into sugar; and it is worthy of remark, that such treatment has greatly diminished the excretion of sugar, without, however, suppressing it, and has also ameliorated the other symptoms. Dr. Gray of Glasgow was induced to give rennet in teaspoonful doses after each meal, and published three cases, in two of which it occasioned apparent cure. (Monthly Journal, January 1853.) He argues, that if out of the body it converts a solution of sugar into lactic acid, it may have a similar effect upon a solution of sugar within the body; and bearing in mind that lactic acid is found in the juice of flesh, and, according to Liebig, is a supporter of the respiratory process, he considered that if sugar formed in the body of a diabetic patient could be converted by the rennet into lactic acid, it would be burned in the lungs; and that if a larger quantity was formed than could be consumed in this way, that portion would be excreted by the kidneys. In consequence of this ingenious theory, and the facts in its support adduced by Dr. Gray, rennet has been given in several cases admitted into the Royal Infirmary, but without success.

The researches of M. Bernard have introduced other views as to the origin of diabetes. He admits that sugar may be formed in the process of digestion, and that a certain amount of it may, as a result of absorption from the alimentary canal, find its way into the blood. But he has shown that, in dogs fed entirely on animal food, sugar may be demonstrated to exist in the liver and in the blood of the hepatic vein, while it is absent in the portal vein. Moreover, he has shown that sugar is a normal secretion of the liver in all animals, from man down so low in the scale as the mollusca; and that, moreover, it is secreted by the liver of the fœtus. He has proved, experimentally, that this function is increased, and diabetes produced, by irritating the eighth pair of nerves at their origin in the fourth ventricle; while, on the other hand, section of these nerves destroys its formation. I have seen M. Bernard perform these experiments, and repeated them myself in this city, and have no doubt regarding the accuracy of the results. That sugar does not exist normally in urine and blood drawn from the arm, is explained by its rapid decomposition in a state of health, and its excretion by the lungs. But when so increased that the lungs cannot excrete the whole of it, then it passes off by the kidneys, and hence diabetes. M. Bernard has also ascertained, that although section of the pneumogastric nerves destroys the formation of sugar in the liver, it is restored by artificially irritating their central cut extremities; and that diabetes is produced exactly in the same manner as by irritating their origins in the brain. He was therefore led to conclude, that the nervous action necessary for the secretion of sugar does not originate in the brain, to be transmitted directly along the pneumogastrics, but indirectly and by reflex action; the vagi being incident nerves, the medulla oblongata the centre, and the spinal cord, communicating with the solar ganglion, the excident channel. Following out this theory, he found that whenever the respiratory function is violently stimulated, sugar appears in the urine; and that, whenever æther or chloroform is given, a temporary diabetes is occasioned. He further supposes, that in the same way that the lungs thus act by reflex nervous influence on the liver, so increased action of the liver acts upon the kidney; consequently, that the sugar produced in excess by one organ is excreted by the other. Hence may probably be explained the occasional temporary presence of sugar in the urine, independent of the disease known as diabetes.

Continuing his researches, M. Bernard has arrived at the conclusion, that the liver does not secrete sugar directly, but rather a substance which is transformed into sugar by the aid of a ferment. This substance he has at length succeeded in separating from the liver, when it presents all the physical and chemical properties of hydrated starch. The ferment he presumes to exist in the blood, so that when by the vital action of the liver the starchy substance is formed, then by its coming in contact with the blood, its chemical transformation with sugar is effected. The blood thus loaded with sugar on arriving at the lungs, is in its turn decomposed by the oxygen of the air, and disappears. Hence the liver and the lungs are so far opposed to one another in function, that the one produces the substance out of which sugar is formed, whilst the other decomposes the sugar which in health exists in that part of the circulation only that lies between the liver and lungs. It follows that the occurrence of sugar in the circulation generally, and its presence in the urine, is probably dependent not so much upon excess of hepatic, as upon diminution of pulmonary action. It is certain that the great majority of diabetic patients die phthisical.

These more recent views of Bernard point to the importance of the observations made by Virchow, Busk, Carter, and others, as to the existence and even wide diffusion of starch corpuscles throughout the animal economy (Carter), and should stimulate organic chemists to ascertain whether some chemical change in the lung may not be the true cause of diabetes.

In the meantime, the researches of M. Bernard explain why Rollo's treatment diminishes the excretion of sugar, by cutting off all that enters the blood through the alimentary canal. According to Traube, the intensity of the secretion of sugar varies at different times of the day, and under different circumstances. Thus it is greatly increased after meals, and is least during the night. At the commencement of the disease, it is principally derived from the food; in the latter stage, is largely formed by the organism. Hence why treatment directed to the stomach does not cure, because it fails to affect the hepatic organ. Bernard's observations appear to me also capable of throwing light on the good effects of opium, from its power of diminishing nervous irritability—effects which are universally recognised in this disease. No other practical results, however, are as yet derivable from them, unless the well-known symptom of dryness of the skin be connected with the cause of the disorder, in which case diaphoretics, though they have often been used with great benefit, would be more strongly indicated. Or, again, would exercise and a cold atmosphere, which increases the oxygenating power of the lungs, be of any avail? Further researches are required on these points, and it is to be hoped that practitioners, no longer *exclusively* directing their attention to the digestive organs, may, by new efforts, ultimately be enabled to control this singular disorder.

The diet ordered in Case CC. is one which admits of very slight formation of sugar in the alimentary canal, and, together with opiates and the occasional use of the warm bath, constitutes the best treatment which has hitherto been adopted. Its good effects were well manifested, although it proves, in conjunction with the confinement of an hospital, very irksome to the patient.

CONTINUED FEVER.

A state of fever may be said to exist when we find the pulse accelerated, the skin hot, the tongue furred, unusual thirst, and headache. These symptoms are commonly preceded by a period of indisposition varying in extent and severity, the febrile attack being marked by a rigor or sensation of cold. This rigor, though not invariably well characterised, is the symptom from which, when present, we date the commencement of the fever.

Although fever may in one sense always be said to exist when the above group of symptoms is present, such fever may be idiopathic and essential, or symptomatic of some local lesion. It is to the former condition that the term fever is universally applied. Some pathologists, indeed, have endeavoured to show that there is no such thing as idiopathic or essential fever, although they have differed among themselves as to the lesion of which it is symptomatic. Intermittent fever has been supposed to be symptomatic of diseased spleen, and remittent fever of intestinal derangement. With regard to continued fever, some have spoken of cerebral, others of intestinal or abdominal typhus. Another class have supposed, from the occasional appearance of an eruption on the skin, that it is allied to the exanthemata. If, however, you carefully watch the Edinburgh continued fever, you will easily satisfy yourselves that it frequently occurs independent of any of these lesions. Did we indeed adopt these views, we might, as Dr. Christison has pointed out, with more plausibility, maintain the existence of a pulmonary typhus, as we observe the lungs to be much more commonly affected in this city than any other organ in the body during fever. I agree, therefore, with those who consider continued fever as an essential disease, dependent on some unknown constitution of the blood, and occasionally accompanied or followed by various local lesions of the cranial, thoracic, or abdominal viscera, and with various eruptions of the skin.

Although this may be considered as the correct general view of continued fever, it cannot be denied that it assumes various forms, which have been described in different ways by authors in this and foreign countries. Considerable confusion has consequently arisen, as to whether fevers observed in different places, and at various times, were identical or dissimilar in their nature; or whether the varieties they presented were only attributable to the concomitant lesions which might be present. Any one who studies fever first in this city, and afterwards in Paris, will soon convince himself that there are at least two predominant kinds of fever;—the one called by us typhus, the other called by the French typhoid,—that is, resembling typhus. Again, those who have studied fever in Edinburgh for the last fourteen years consecutively, are aware that every now and then a form of the disease is prevalent, which runs a short course, but has a tendency to relapse at pretty regular periods. Lastly, there is in fever, as in most other diseases, a kind which is very slight, and soon ceases,—a so-called febricula.*

Every practical physician is acquainted with these forms of fever; but whether they constitute varieties of the disease, which can be at all times separated, which have a distinct and invariable course, the one not being protective of the other, and so on, are points that are by no means determined.

Dr. Jenner, in a very elaborate series of papers inserted in the "Monthly Journal" during 1849-50, has endeavoured to show that febricula, relapsing fever, typhoid and typhus fevers, are four distinct diseases. He considers them, to use his own language, "as distinct from each other as are measles, scarlet fever, and small-pox, the poison of the one being, by no combination of circumstances, capable of producing, inducing, or exciting the others." He gives the following characters which, according to him, serve to distinguish these four kinds of fever.

"*Febricula.*—A disease attended by chilliness, alternating with

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* The variable amount and extension of fever at different times may be gathered from the following table showing the number of cases which have entered the Royal Infirmary of this city during the present century, which I extract from a paper lately published by Dr. Christison—(Edinburgh Med. Journal, Jan. 1858.)

TABLE showing the Annual Number of Fever Cases in the Royal Infirmary since the beginning of the century.

12 Mons. to Dec.	1800,	329	12 Mons. to Dec.	1819,	1088	12 Mons. to Oct.	1838,	2244
„ „	1801,	161	„ „	1820,	638	„ „	1839,	1235
„ „	1802,	156	„ „	1821,	327	„ „	1840,	782
„ „	1803,	232	„ „	1822,	355	„ „	1841,	1372
„ „	1804,	323	„ „	1823,	102	„ „	1842,	842
„ „	1805,	175	„ „	1824,	177	„ „	1843,	2080
„ „	1806,	95	„ „	1825,	341	„ „	1844,	3339
„ „	1807,	110	9 Mons. to Oct.	1826,	450	„ „	1845,	683
„ „	1808,	111	12 Mons. to Oct.	1827,	1875	„ „	1846,	693
„ „	1809,	186	„ „	1828,	2013	„ „	1847,	3688
„ „	1810,	143	„ „	1829,	771	„ „	1848,	4693
„ „	1811,	96	„ "	1830,	346	„ „	1849,	726
„ „	1812,	103	„ „	1831,	758	„ „	1850,	520
„ „	1813,	75	„ „	1832,	1394	„ „	1851,	959
„ „	1814,	87	„ „	1833,	878	„ „	1852,	691
„ „	1815,	96	„ „	1834,	690	„ „	1853,	574
„ „	1816,	105	„ „	1835,	826	„ „	1854,	168
„ „	1817,	485	„ „	1836,	652	„ „	1855,	201
„ „	1818,	1546	„ „	1837,	1224	„ „	1856,	180

sense of heat, headache, white tongue, confined bowels, high coloured scanty urine, hot and dry skin, and frequent pulse, terminating in from two to seven days, and having for its cause excess, exposure, over-fatigue, etc.—*i. e.*, the cause of febricula is not specific.

"*Relapsing Fever.*—A disease arising from a specific cause, attended by rigors and chilliness, headache, vomiting, white tongue, epigastric tenderness, confined bowels, enlarged liver and spleen, high coloured urine, frequent pulse, hot skin, and occasionally by jaundice, and terminating in apparent convalescence in from five to eight days; in a week a relapse—*i. e.*, a repetition of the symptom present during the primary attack. 'After death, spleen and liver are found considerably enlarged; absence of marked congestion of internal organs.'

"*Typhoid Fever.*—A disease arising from a specific cause, attended by rigors, chilliness, headache, successive crops of rose spots, frequent pulse, sonorous râle, diarrhœa, fulness, resonance and tenderness of the abdomen, gurgling in the right iliac fossa, increased splenic dulness, delirium, dry and brown tongue, and prostration, and terminating by the thirtieth day. After death, enlargement of the mesenteric glands, disease of Peyer's patches, enlargement of the spleen, disseminated ulcerations, disseminated inflammations.

"*Typhus Fever.*—A disease arising from a specific cause, attended by rigors, chilliness, headache, mulberry rash, frequent pulse, delirium, dry brown tongue, and prostration, and terminating by the twenty-first day. After death, disseminated and extreme congestions; in young persons, enlargement of the spleen."—(*Medical Times—Twentieth Paper.*

Dr. Dundas of Liverpool has advanced another doctrine, entirely opposed to that of Dr. Jenner. His views on the subject of fever are essentially these:—Not only are there no specific differences between the various kinds of continued fever, but there are none between this and intermittent or remittent fevers. All these disorders, according to Dr. Dundas, are essentially one disease, and may all be cured by one remedy, viz., quinine. Given in doses of ten grains, repeated at intervals of two hours, until five or six doses had been taken, he says that it arrested or cut short a continued, as it did an intermittent, fever. These statements, deliberately brought forward, and still maintained, by Dr. Dundas, who, in Brazil and in this country, has had abundant opportunities of carrying out the practice, supported, moreover, by confirmatory cases, published by different medical men in Liverpool, determined me to give this practice a fair trial.

During the months of November, December, and January 1851-2, I treated nineteen cases of continued fever in the clinical wards, of which four were febricula, one relapsing, three typhoid, and eleven typhus fever. In a disease so common as fever, I have thought it necessary to condense the facts as much as possible, from the lengthy and accurate reports taken in the hospital books. All these cases, however, were examined with the utmost care, and all the phenomena noted, especially in reference to the two doctrines I have placed before you,—viz., those of Dr. Jenner and of Dr. Dundas. Further, to avoid repetition, I have simply stated that the quinine treatment was employed; but in every case this treatment was practised exactly in the manner recommended by the last-named physician. The curious effects we observed to be produced by the quinine I shall notice afterwards.

FEBRICULA.

Case CLXXXIII.[*]—Margaret Divine, æt. 42—admitted 26th Nov. 1851. Was attacked with rigors on the 23d, after complaining for two days before of headache and general debility. On admission complained of pain in the limbs, and general dull pains over the body. Had no appetite, but great thirst, with a dry furred tongue; she is very subject to pyrosis; skin was hot and dry, pulse 80, strong; a slight murmur accompanied the first sound of the heart. ℞. *Sol. Acetat. Ammoniæ*, ℥i; *Vini Antimonialis*, ℥ij; *Aquæ*, ℥iij. M. To take one tablespoonful every four hours.

November 28th.—Better to-day; pulse 72; a sediment filling one-fourth of the glass is deposited in the urine; still general dull pain of surface. *29th.*—The general pains are gone. She feels quite well, and wishes to rise; she was now convalescent, but owing to weakness, was not dismissed until the *15th of December*.

Case CLXXXIV.[*]—Susan Rennie, wife of labourer, æt. 49—admitted 15th December 1851. On the 11th, was seized with severe rigors, followed by pain in the lower part of the back and the limbs; with frequent alternations of shivering and perspiration during the day; there was severe headache, with loss of appetite, and oppressive thirst. On admission, the tongue was slightly furred; she had constant nausea, and vomited nearly everything she took; the skin was hot, but moist; there was no eruption on her person; she had a short cough, with trifling expectoration. Pulse 76, small. She continued in this state till December 19th, when, after sweating and a lengthened sleep, the fever left her, and she became convalescent, and was dismissed *January* 1. The treatment consisted of salines, anodynes, and stimulants.

Case CLXXXV.[†]—Thomas Stevens, æt 21, servant of a cowfeeder, admitted November 24, 1851. On the afternoon of the 23d, while engaged in his usual work, he was seized with severe rigors, headache, and pain in the back; he passed a sleepless and uneasy night, and on attempting to resume work next day, found himself quite unable to do so, from return of the rigors, and aggravation of the headache. Had not been exposed, so far as he knew, to contagion. Had been already a patient in the house several times, having suffered from fever on three different occasions. On admission, the tongue was moist and clean, and the appetite was not much impaired, but he had very oppressive thirst. Bowels had been irregular some time before admission. On examination of the chest, slight bronchitis of the left side was found to be present, and the sputum was thick, viscid, and mucopurulent. Skin was very dry and hot, he complained of pain in the head, principally in the frontal region, and of a throbbing character. Pulse 72, of good strength

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[*] Reported by Mr. J. L. Brown, Clinical Clerk.

[†] Reported by Mr. W. M. Calder, Clinical Clerk.

He was ordered a full dose of castor oil, which produced copious evacuations from the bowels; and following mixture:—℞ *Vini Antimonialis*, ℥ss; *Sol. M. Morph.* ʒi; *Aquæ*, ℥vss. M. Take ʒss every second hour. He continued to complain of headache and general restlessness, and the pulse kept about 80, very full and strong, till the evening of the 25th, when he began to perspire a little; and on the forenoon of the 26th, he had profuse sweating. On the 30th, the antimonial solution was stopped; he improved rapidly, and was dismissed quite well, on the 8th of December.

Case CLXXXVI.*—Andrew Downan, æt 11, tobacco-boy—admitted January 14th, 1852. On the 11th was attacked by violent headache, lost all appetite for food, but felt exceedingly thirsty; his skin felt very hot, and he complained of general languor and debility. Had no distinct rigors, or other premonitory symptoms. Had suffered from typhus fever about five years ago, at which time he was nine weeks in the house. On admission, tongue was dry, of florid red colour, but thinly coated with a white fur, through which the red papillæ were very conspicuous. No appetite, but considerable thirst; skin hot and dry, without eruption; has had no sweating since he became ill; but had profuse diaphoresis the morning after admission, when the skin became cool and moist, and the pulse fell to the natural standard. He continued two days in the house, at the end of which time he felt well enough to get out of bed, and leave the ward. He did not return.

Commentary.—Febricula was the most common form of continued fever during the early part of the winter session in Edinburgh, and the four cases above given, constitute good examples of the disorder as it existed in the city during that period. It will be observed that the fever in all of them was very strong, and the rigors well marked, although the pulse was not greatly accelerated. It is impossible to distinguish such cases at the commencement from typhus—a circumstance, as we shall see, of great importance, when the question comes to be, whether or no we can arrest the progress of a continued fever, after it has fairly set in. It ought to be a *sine qua non* in all such trials, not to commence the treatment until the seventh day. If, for instance, we had commenced Dr. Dundas's treatment with the above cases, we might have been led to believe in its efficacy, whereas we shall see that the typhoid and typhus cases exhibited a very different result.

RELAPSING FEVER.

Case CLXXXVII.*—Edward Anderson, a Swede, æt. 25, hawker—admitted Dec. 15th, 1851. Seized with rigors on the 8th; had great pain in the head, back, and over the body generally, and felt languid and depressed, though he was not compelled to take to bed till the 14th. On admission, tongue thickly coated; no appetite; much thirst; bowels constipated; slight pain of head; pulse 70, of natural strength; skin hot, but moist, presenting a well-marked eruption of small roundish and oval spots of a rose-red tint, slightly raised above the surface of the skin, entirely disappearing under pressure; widely scattered, but most abundant on the thorax. *December 16th.*—Slept badly; pulse 75, natural strength; sweating a good deal;

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* Reported by Mr. W. M. Calder, Clinical Clerk.

much thirst, but total disinclination for food ; spots more numerous. To have an effervescing draught, and six ounces of wine ; also half an ounce of the following mixture at bed-time :—*Tinct. Hyoscyami,* ʒj ; *Tinct. Kino,* ʒij ; *Aq.* ℥ij. Continued to improve daily after this date ; and had no feverish accession while he remained in the ward. Was dismissed on the 29th at his own desire, as he was anxious to resume his occupation, though still rather weak. The several systems were carefully examined before dismissal, and found normal.

He was re-admitted on the *5th of January* 1852. Had resumed his work, but on the 1st inst., 24 days after the first rigor in the former attack, was again seized with shivering, and felt pain all over the body, but especially complained of pain in the throat, and difficulty of swallowing. There was also considerable dyspnœa. On admission, tongue dry and coated ; mucous membrane of fauces and pharynx much congested, and covered with a thin layer of pus ; bowels constipated ; slight pain over abdomen generally, but especially in the right iliac region ; voice husky and indistinct ; much cough of a convulsive character ; little expectoration ; no abnormal physical signs on examining the chest ; pulse 110, full and hard ; skin hot and flushed ; and over the abdomen there were a few scattered spots of the same shape, and rose-red tint as before. *Vini Antimon.* ℥i ; *Aq.* ℥vj. M. ℥i to be taken every second hour. *January 6th.*—Pain on pressure in iliac region increased ; had little sleep ; pulse 90, full, but softer. Acetate of Ammonia, with Morphia—six leeches to right iliac region. *January 8th.*—(8th day, or 32d from first attack), sweating a little last night ; no change in urine ; no pain on pressure over the abdomen. *January 9th.*—Eruption very distinct, and continuing well marked for 24 hours, after which it gradually faded. *January 12th.*—(36th day), more feverish to-day, and complains of more pain in the throat ; pulse 120, sharp and vibratory ; urine natural. After this date he began to improve gradually, and was quite convalescent on February 1st.

Commentary.—I have called the above a case of relapsing fever, simply because after the febrile state, counting from the first rigor, had continued for full seven days, there was complete recovery ushered in by diaphoresis. So well was this man, that he insisted on going out and resuming his occupation as a hawker. On the 24th day, however, he was again seized with all the symptoms of the primary attack, including on both occasions, a distinct exanthematous eruption of rose-coloured, lenticular, elevated spots. I am aware it may be contended that this was a case of typhoid fever. Dr. Jenner would probably so consider it on account of the eruption, the iliac tenderness, and its termination about the 30th day. But if the circumstance of a complete recovery and a distinct relapse, is to be considered as a sufficient cause for distinguishing a fever, it is scarcely to be conceived that these occurrences could ever be better characterised than in the above case. There is this difference, that the relapse occurred on the 24th, and not on the 14th day. This, however, I have seen frequently happen in the epidemic of relapsing fever which occurred in this city during 1843. Though most common on the 14th day, this period was passed over, and the first relapse occurred on the 21st or 24th day. One or more relapses are not unfrequent, and it would appear as if the period of the first had been passed over.

Dr. Christison has pointed out that this form of fever is identical with inflammatory fever, or the synocha of Cullen, and in his article on Fever in the Library of Medicine, he has shown their similitude, especially as he had observed it in the Edinburgh Epidemic of 1817 to 1820, and 1826-27. During the great epidemic of 1843-4, I had abundant opportunities of studying it, not only in others, but in my own case, having been attacked a fortnight after my appointment as Physician to the fever hospital. On that occasion, Dr. Christison, who attended me, at once pronounced the disease to be the synocha, which he had seen twenty years previously, and confidently predicted the relapse, which occurred on the fourteenth day, when I imagined myself to be convalescent. That remarkable epidemic has been carefully described in the writings of Alison, Craigie, Cormack, Halliday Douglas, Wardell, and others.

TYPHOID FEVER TREATED BY QUININE.

Case CLXXXVIII.*—Miles Murray, æt. 25, labourer—admitted November 7, 1851. First seized with rigors on the evening of the 2d, followed by strongly-marked febrile symptoms. No contagion. On admission, features livid and anxious; skin dry and hot; no eruption. Severe frontal headache; pain in the back, and over the whole body. Slight "subsultus tendinum." Tongue moist, but furred; no appetite, but excessive thirst. Pulse 84, full, but soft, occasionally intermittent. Short dry cough, and slight dulness on right side of chest; no unusual rales. *Ordered an antimonial mixture; six leeches to be applied to the head. November 8th.*—Slept well during the night; no delirium. Skin still dry and hot; no eruption; tongue more dry than yesterday. Pulse 82, full, but soft. *Ordered quinine, in ten-grain powders, every second hour. Nov. 9th*, Vespere (7th day).—He has taken the powders regularly since ordered; no marked effect produced except on the pulse, which has come down eight or ten beats after each powder, its strength also being much reduced; there has been much sweating to-day. Still severe headache; no delirium. Urine passed this afternoon exhibits, under the microscope, amorphous lithates; but the deposit, on standing, is inconsiderable. *Nov. 11th.*—Has taken in all 205 grains of the quinine. Slight tingling in the ears this morning, but only transient. Is dull and stupid to-day. Countenance has still a worn and exhausted aspect. Slight cough, and a few scattered sibilant rales on auscultation. Pulse 76, small, and soft. *Suspend the quinine. Wine four oz., mixture with the sp. æther, nitr., and sol. ammon. acetat. Nov. 19th.*—Drowsiness increased since last report, but without any other marked change. No delirium. *Nov. 20th* (18th day).—Urine to-day loaded with lithates. Countenance rather livid. Skin not very hot; thirst moderate. No eruption has appeared. *Nov. 21st* (19th day).—Feverish symptoms returned. No decided delirium, but much drowsiness, and total indifference to what is going on around him. Pulse 80, full and soft. *Nov. 23d*, Vespere (21st day).—Complains to-day of uneasy symptoms in epigastrium, with much nausea. Had slight vomiting in the afternoon. *Nov. 24th.*—Had an emetic ordered last night, which produced copious vomiting; nausea and pain in epigastrium relieved, followed by profuse sweating. *Nov. 30th* (28th day).—Has had considerable diarrhœa during the last four days; checked by the lead and opium pills, and tannin. Slight delirium to-day; skin hot and dry; pulse 96, full, regular; cough more troublesome; bronchitic rales abundant all over the chest. *December 1st.*—Much sweating to-day; strength greatly prostrated; cough oppressive, and expectoration brought up with extreme difficulty; fœces and urine passed in bed. *Has four oz. of wine daily, and an expectorant mixture. Dec. 6th.*—Weakness increasing; almost constant sweating, but no further change. *Four oz. of brandy in addition to the wine. Dec. 7th* (35th day).—Was more restless than usual last night, but there is now no delirium. A bed-sore is threatening over the trochanter of the right femur. Pulse 102, small and weak. *Dec. 10th.*—Cough occurring in paroxysms; weakness increasing. *Dec. 12th* (40th day).—Pulse to-day 130, small and vibratory; skin cool and moist; appetite little better. ℞. *Quinæ Disulph. gr.* iv; Ft. *Pulv. tales,* vj. *One every three hours.* After taking four of the powders, the pulse fell to 102, small and jerking. *Quinine stopped, and brandy and wine resumed.* Next day (41st of fever), he began to shiver about 3 P.M., and presented all the phenomena of a paroxysm of ague, the skin continuing pungently hot for about three hours, but without sweating. In the evening the skin was comparatively cool, and the patient felt languid and drowsy. He was ordered to resume the quinine, five grains every three hours. *Dec. 14th* (42d day).—No return of shivering, or febrile symptoms. After this date he began to improve steadily; and, with the exception of slight sore throat, and return of short dry cough for a few days, had not a bad symptom during the remainder of his stay in the house. He was dismissed perfectly well on the 19th of January, having been 73 days in the ward, and 80 days having elapsed since the occurrence of the first rigor.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

Commentary.—This case was observed and recorded with the greatest care, and I had no difficulty in considering it to be a case of typhoid fever, unusually prolonged, perhaps on account of the pulmonary complication. There were several distinct exacerbations, coming on with marked rigors, at intervals of seven days, followed by increased febrile symptoms. At one period this man's life was despaired of, the profuse sweatings, the diarrhœa, extreme prostration, with partial pneumonia, and general bronchitis, constituted symptoms of a most alarming character, through which, however, with the assistance of stimuli, liberally administered, he eventually safely struggled. This also was the first case of fever in which the quinine treatment was tried. It so happened, that having ordered six doses, of ten grains each, to be administered, and not seeing him on the following day, the drug was by accident continued consecutively for *eighteen* doses, at intervals of two hours each. At the end of that time, no effect having been produced on the fever, it was continued in five grain doses, so that in all he took 205 grains of quinine. Notwithstanding, not only did the fever march on, but, as we have seen, the most alarming prostration was induced. No eruption could be detected during the whole progress of the disease, though daily looked for with the utmost care.

CASE CLXXXIX.*—Marianne Howison, æt 11—admitted January 16. Rigors appeared on the 10th, followed by febrile symptoms. Mother and sister had died immediately before of fever. On admission, pulse 130, full and strong; intense headache; tongue dry and brown; complete anorexia, and great thirst; skin hot, no eruption. On the 17*th*, *the treatment with ten-grain doses of quinine was ordered.* 18*th*.—Five powders were given; and the report to-day is: headache gone; pulse 94, soft; skin moist and cool; tongue moist and red. On the 19*th*, restlessness and heat of skin returned. On the 24*th*, fever was as intense as when she was admitted. 25*th*.—Diarrhœa. 27*th*.—Considerable abdominal pain on pressing right iliac region; *six leeches applied;* ℥vi *of wine.* 31*st*.—Diarrhœa, which had formerly continued only twenty-four hours, has been present continuously for the last three days. *February* 1*st*.—Pulse weak; sordes on lips and tongue; intellect confused; no diarrhœa. *Feb.* 3*d*.—Pulse weak and irregular, 140; is insensible. *Feb.* 4*th*.—Very restless during the night; still insensible; pulse 150, small and jerking; slight hæmorrhage from the gums. Died at seven P.M.

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* Reported by Mr. G. A. Douglas, Clinical Clerk.

Sectio Cadaveris.—Fifty-six hours after death.

The mucous surface of the lower third of the small intestine was scattered over with round and oval elevations, becoming more crowded together nearer the cœcum. The former were of the size and form of a split pea, the latter varied from the size of sixpence to that of an almond. In the lower portion, some of the elevated patches were softened and sloughing, and in one or two places the sloughs had separated, forming ulcerations. The upper third of the large intestines presented also numerous round papular elevations, similar to those in the smaller intestines—the whole exhibiting the various well-known changes of typhoid elevations and ulcerations in a characteristic manner—the peritoneum corresponding to some of the ulcerations unusually congested, but there was no peritonitis. Some of the mesenteric glands enlarged and softened; other organs healthy.

Commentary.—This was a well-marked case of typhoid fever, which was fatal on the twenty-fifth day; and, on dissection, the intestinal lesion, characteristic of the disease, was discovered. Here also the quinine treatment was tried, with the effect at first of moderating some of the symptoms, although on the following day they returned with increased intensity. As in the last case, no eruption could be discovered on this girl, though carefully looked for. It is further worthy of observation, that the mother and sister had died of a similar disease. The contagious nature of this form of fever is still doubtful, as many insist that the intestinal lesion is dependent on purely endemic causes.

CASE CXC.*—John Anderson, æt. 21, sailor — admitted 29th December 1851. On the 4th of December, having been exposed to cold during his passage from Elsinore, he was seized with rigors, diarrhœa, and thirst, which continued several days. From this condition he was gradually recovering when the ship entered the harbour of Leith on the 24th. That night he was again attacked with rigors, great thirst, and diarrhœa, followed on the 27th by intense sudden pain in the abdomen, vomiting, and constipation. On admission, the features were shrunk and hard; skin cold and clammy; tongue red and furred; severe griping pain in abdomen, which is shrunk; no tympanitis; bowels costive; scanty urine; no headache; pulse 126, feeble and vibrating. *Twenty-four leeches were applied to the abdomen; one opium pill every two hours. Dec.* 30.—Unrelieved; mind wandering; bowels freely opened without relief; pulse very rapid, and almost imperceptible. Died at one P.M.

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* Reported by Mr. A. Dewar, Clinical Clerk.

Sectio Cadaveris.—Twenty-three hours after death.

Peritoneum purple, congested, having flakes of lymph upon the surface. It contained several ounces of dirty turbid yellow fluid, having a slight fœcal odour. Stomach and duodenum normal. About the middle of the jejunum a small ulcer one-half of an inch by one-eighth in size, penetrating all the coats of the intestine; edges pale and not raised. Mucous membrane of the lower part of ileum and cœcum mottled with slate-coloured patches; Peyer's patches prominent, and several ragged ulcers situated in their course, and in some of the solitary glands; ulcers flat, with smooth edges. Intestines contained fluid fœces of a yellow colour, resembling pea-soup.

Commentary.—This was another undoubted case of typhoid fever, with intestinal disease, terminating by peritonitis, the result of a perforating ulcer. The leading facts were communicated to me with great clearness after the boy's death by the captain of the vessel, in whose log was recorded the day of the attack, the remission, and the renewed attack on the twenty-first day. He also had observed no eruption on the skin, but of course his information on such a point was of no great value.

The three cases now given have enabled you to study the principal phenomena presented by typhoid fever. With regard to its diagnosis, if you rely on the characters prominently given by Dr. Jenner, especially with regard to the eruption, it must be evident you will be frequently deceived. It so happens that in none of the three cases was an eruption observed, although, in two, it was carefully sought for; and in one of these latter the nature of the disease was placed beyond all doubt by dissection, which, after all, is the only *certain* proof of typhoid fever. I have been in the habit of considering the most trustworthy symptoms distinguishing this form of fever from typhus, to be the remissions; a peculiar character of the countenance expressive of abdominal pain; the diarrhœa (especially when the stools resemble pea-soup); and marked tenderness on pressing deep down into the right iliac lesion. I acknowledge, however, that these symptoms, in the absence of an epidemic of typhoid fever, are often deceptive, even when the disease has continued beyond the thirtieth day.

Typhoid fever is, on the whole, a rare disease in Edinburgh. It is common, however, on the opposite coast of Fife, and at Linlithgow. The late Dr. John Reid used to remark, when he was pathologist to the Infirmary, that all the bodies he opened affected with typhoid ulcerations of the intestines, came from one or other of these places. On the other hand, in Paris, and in many places on the continent, it is the prevailing form of fever. In the fever wards of this Infirmary you have the most extensive opportunities of studying typhus; in the hospitals of the continent, and especially at Paris, Berlin, Prague, and Vienna, you will see typhoid or enteric fever on a large scale. These facts serve to clear up much of the confusion which has entered into the discussions concerning continued fever by foreign and domestic writers. They also explain why the doctrine of Broussais, who conceived typhus to be gastro-enteritis—although everywhere on the continent adopted for a time—was, from the first, rejected as false by this school. At the same time there have been certain epidemics in Edinburgh during which typhoid fever has been prevalent, as there have been always cases of true typhus mixed up with the enteric fever of the continent. Thus, in the epidemic of 1846-7, an unusual number of typhoid cases were mingled with the typhus; and I have more than once seen distinguished physicians and teachers on the continent much puzzled by finding no morbid lesion in fatal cases of fever, which, from my previous knowledge of the disease in Edinburgh, I had no difficulty in recognising as being those of genuine typhus.

Now, it is an interesting inquiry to ascertain what are the causes which should occasion such a general typhoid fever abroad, and such a general typhus in this country. For my own part, I have been led by long observation of the fever, both here and on the continent, to form the opinion that it is in some way connected with the diet, which, among the lower orders, is very different in France or Germany from what it is in this country. Acid wines and food, impoverished diet, excessive use of vegetables and fruit, predispose on the continent to intestinal disorders. I have thought this theory strengthened by the fact, that when, in 1846-7, typhoid fever was so largely mingled with typhus in Edinburgh, owing to a failure in the potato crop, various kinds of substitutes were employed by the people, and scurvy became common.

Typhus Fever treated by Quinine.

Case CXCI.*—Mrs. Macdonald, a nurse in the Infirmary, æt. 50—admitted November 10th. Seven days ago was unusually exposed to cold, and two days afterwards experienced vomiting, pain in the back, and epigastrium, with headache, and prostration of strength, which last symptom was apparently increased by a purgative taken on the 8th. On admission, the skin was exceedingly hot; pulse 102, strong; tongue white and furred; great thirst, and headache; anorexia and nausea; slight bronchitis. On the 11*th, an emetic was ordered, and two hours after its operation the quinine treatment to be followed.* On the 12*th*, it is reported that she took four quinine powders of 10 grains, at intervals of two hours, but vomited the fifth. Three others, however, were retained during the night, so that 70 grains have been administered. At present, she is in no way relieved. Skin hot and dry; pulse 100, strong; tongue furred; pains in head and epigastrium unabated. Eight leeches to be applied to the head, and *Quininæ Sulph.* grs. v *every two hours. Nov.* 13*th.—Has taken five more quinine powders.* Pulse now 78, full; considerable vomiting, and pains in epigastrium; other symptoms the same. Cold douches to the head; warm fomentations to the epigastrium. *Pill of bismuth and opium every four hours. Nov.* 14*th.*—Head and stomach much relieved. It is reported that last night the limbs were partially convulsed, and her eyes fixed, a state that lasted seven minutes. *Nov.* 15*th.*—Confusion of intellect, and restlessness. Pulse rapid and weak. ℥iv *of wine. Nov.* 17*th.*—Has remained in the same condition. Slight puffing of the cheeks observed on expiration. *Nov.* 18*th.*—Puffing of cheeks more marked; unable to move the right arm; great prostration. *Wine* ℥vj. *Blister to the head. Nov.* 19*th.*—Died comatose. There has been no eruption.

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* Reported by Mr. J. L. Brown, Clinical Clerk.

Commentary. — No examination of this woman's body could be obtained, and we are therefore in doubt as to whether an exudation had or had not taken place between the membranes of the brain. The cerebral complication, however, was in this case well marked. At first, indeed, there was nothing more than usual; but the vomiting was obstinate, and latterly the convulsion and partial paralysis indicated distinctly the organ affected. Having previously resolved to try the quinine treatment, it was given energetically in this case, but without any effect on the progress of the fever. It may even be contended that it did harm, seeing we had a cerebral complication to deal with. Of this, however, at an early period, we could not judge, although it appears to me that the quinine practice is contra-indicated in such cases.

Case CXCII.*—George Johnstone, boot maker, æt. 21 — admitted 8th December 1851. Had severe rigors on 29th November, which were followed by the usual feverish symptoms. No exposure to contagion. On admission, tongue densely furred, coated, and cracked; no appetite; intense thirst; skin hot and dry; confused in his ideas, without great pain in the head; pulse 108, full. *Dec.* 9*th.*—Slept very ill, and continues the same as yesterday. Pulse 120, full. ℞ *Ol. Ricini,* ʒvj. *Vespere.*—℞ *Sulph. Quinæ,* ʒj; *Div. in Pulv.,* vj. *One every two hours.* Bowels freely moved in the afternoon; great heat of skin; much mental excitement; pulse 120, full and strong; no eruption. *Dec.* 10*th.*—Slept well; no restlessness; skin cool and moist; no headache; slight singing in the ears; pulse 87, of good strength. Pulse rose to 88 during the day, and in the evening was full and strong. *Quinine repeated,* 10 *grains given at first, then* 13 *grains every two hours. Dec.* 11*th.*—Pulse 84, of good strength; thirst great; skin moist; no eruption. *Dec.* 12*th.*—(14th day), thirst less; some appetite; no eruption; slight deposit in urine. Improved from this time, and was dismissed January 5th.

Commentary.—This was a slight case of fever from the beginning, with no alarming symptoms, recovering on the fourteenth day. Whether this result was in any way owing to the quinine is doubtful, for, as we shall see, there were other cases very similar, in which the fever was of no longer duration. When first given, it certainly brought down the pulse, and all the symptoms abated. On their return, therefore, the treatment was again had recourse to, and the dose increased to thirteen grains. On this occasion, however, no further benefit was obtained; and it appeared to me that the disease terminated with critical sediment in the urine, on the fourteenth day, in the usual manner. There was no eruption in this case.

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* Reported by Mr. A. Dewar, Clinical Clerk.

Case CXCIII.*—John Craik, blacksmith, æt. 23—admitted January 5, 1852. On December 28th, had severe rigors, followed by feverish symptoms, and during the night, severe cough, and much expectoration. On admission, tongue red and moist; slight sore throat; no appetite; constipation; pulse 80, of good strength; severe cough, and considerable expectoration, tinged with blood; mucous rales are heard over chest, chiefly at base of lungs; skin soft and dry; no eruption, or exposure to contagion. *January 7th.*—Bowels freely opened; cough very severe. *Ordered saline mixture; blister to front of chest.* *Jan. 8th.*—(11th day), very restless; delirious; drowsy and stupid; cough abated; pulse 108, weak. *Vespere.*—Pulse 121, quick; skin hot and dry. *Quinine treatment ordered.* *Jan. 9th.*—Skin cool and moist; pulse 90, weak; tongue moist and red; extreme deafness. *Jan. 10th.*—Slight diaphoresis. *Jan. 11th.*—(14th day of fever), skin hot and dry; flushed and delirious; marked rose-coloured eruption over chest and abdomen; great thirst; sordes on lips and teeth; tongue red and moist, dark in centre. *Jan. 12th.*—Delirious; eruption remains; sordes disappearing; skin hot and dry; cough severe; crepitation distinct at base of right lung; no dulness, but marked resonance. *Ordered antimonial mixture.* *Jan. 13th.*—Countenance flushed; pulse rapid and weak; great prostration. *Blister to right side; wine ℥iv.* *Jan. 14th.*—Symptoms urgent. *Jan. 15th.*—Great thirst; tongue foul; crepitation gone, and the respiration is heard very indistinctly; vocal resonance well-marked. *Jan. 17th.*—Improving; no dulness, nor vocal resonance; some sibilant rales; slight deposit in urine. Steady improvement until *February* 20, when there was œdema of lower limbs; urine normal. Is now quite convalescent. Dismissed.

Commentary.—In this case it will be observed that, although the quinine produced at first an apparent improvement, the fever, with delirium and the usual symptoms, shortly returned, and ran a rather protracted course, owing to the pulmonary complication.

Case CXCIV.*—Anne Dowie, æt. 18, servant—admitted December 10th, 1851. Seized with pain in the head, heat of skin, and general debility, Dec. 3d. Next day general pain over the body, which has continued since. On admission, pulse 120, feeble; tongue dry, red, and fissured; no appetite; great thirst; bowels constipated; skin hot, and covered with a clammy sweat, and presenting on the chest and arms an eruption of numerous minute petechial spots, which have existed for some days; slight cough and expectoration; scattered bronchitic rales over chest. *Dec. 11th.*—*The quinine treatment was ordered.* After the fifth dose of 10 grs., slight deafness, ringing in the ears; one more dose taken, after which the medicine was stopped. *Dec. 12th.*—Pulse 80, "excessively small and weak;" surface cooler. In the afternoon, the pulse was 86, strength much increased; skin warm and moist; tongue dry, rough, and fissured; much thirst; respirations 43 in the minute; slight subsultus. *13th.*—Pulse 84, of good strength; skin moist; eruption unchanged; lips covered with sordes; tongue dry and cracked. On the *14th*, she had smart diarrhœa, which was checked by an astringent mixture. *15th* (12th day).—Appearance of patient much better; pulse 88, of good strength; eruption faded; tongue cleaner. *17th* (14th day).—Cough troublesome; a good deal of opaque dirty-looking muco-purulent matter expectorated; moist rales heard on auscultation; thirst and anorexia continue; urine turbid, but without sediment. *19th* (16th day).—Urine loaded with lithates; patient improving. After this date, she recovered rapidly, and was discharged on the 15th January, quite well.

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* Reported by Mr. W. H. Broadbent, Clinical Clerk.

Commentary.—This was a well-marked case of petechial typhus, in which the quinine treatment was tried, without apparently in any way arresting its course, although the physiological action of the drug upon the pulse was remarkably well characterised.

Case CXCV.*—Isabella Adamson, æt. 20, servant—admitted December 19th, 1851, with eczema of the scalp and face. Rigors appeared *Jan. 4th*, followed by febrile symptoms. Rose-coloured exanthematous spots appeared on the chest and arms on the *9th*. On the *10th, the treatment by quinine commenced*. On the *11th*, the immediate effects of the quinine have disappeared, and the report is—Pulse 100, full and compressible; had no sleep; pain in head very intense; no sweating; tongue furred and cracked; eruption darker. *14th.*—Confusion of intellect; vertigo; pulse 110, weak and intermitting; sordes on lips and tongue; subsultus tendinum. *17th.*—Head symptoms have been relieved by a blister; and she now began slowly to improve. On the *24th*, pulse 80; returning appetite; sordes disappeared. On the *28th*, convalescent.

Commentary.—This also was a remarkably well-characterised case of fever, of considerable severity, evidently caught in the ward, running its usual course, notwithstanding the quinine treatment was commenced so early as the sixth day. The eruption here presented rose-coloured spots at the commencement, becoming darker afterwards. Seven cases of continued fever treated by quinine have thus been recorded, which we may now contrast with six cases treated in the ordinary way.

Typhus Fever treated without Quinine.

Case CXCVI.†—Anthony Kerrachar, labourer, æt. 20—admitted November 12, 1851. On the 7th, had rigors, followed by confusion of head and general feverish symptoms. No exposure to contagion. On admission, tongue furred and white; intense thirst; no appetite; expression anxious, only slight headache; no eruption. *Nov.* 13.—Cough severe; dulness at lower part of left lung; cough mixture. *Nov.* 20.—Feverishness gone; sleeps well; expression good. Dismissed on Dec. 8, 1851.

Case CXCVII.†—Laurence Cochrane, labourer, æt. 43—admitted December 1st, 1851. Had first severe rigors, Nov. 28th, followed by febrile symptoms. No exposure to contagion. Had fever six years ago. On admission, tongue furred and moist; appetite gone; constipation; pain in back and loins, and great weakness. Complains of cough; no expectoration; chest resonant, but crepitation is heard at base of left lung; pulse 100, full and regular. *Dec. 2d.*—Bowels well moved; pain unrelieved; appetite returned; no eruption. *Dec. 12th.*—Fever disappeared, but very weak. Dismissed *Jan. 12th.*

Commentary.—Both these cases, although complicated with pulmonary disorder, ran their usual course, and in this respect resembled Case CXCII., in which quinine was given. In neither was there any eruption.

Case CXCVIII.‡—Isabella Stevenson, æt. 44, washerwoman—admitted

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* Reported by Mr. W. H. Broadbent, Clinical Clerk.

† Reported by Mr. A. Dewar, Clinical Clerk.

‡ Reported by Mr. J. L. Brown, Clinical Clerk.

November 10th, 1851. On the 3d, first experienced pain in the head, followed by sweating, but says she had no rigors. She was in bed, complaining principally of cephalalgia, during the whole of last week. On admission, the skin is dry and hot, but at night always bathed in perspiration. No eruption; tongue furred; no appetite; thirst moderate; intense headache, with occasional stupor; pulse 120, small, threadlike. *Cold to the head, and stimulants.* On the 12*th*, crepitation was heard in the left lung posteriorly. 13*th.*—Great dyspnœa; moist and dry rales over anterior of chest. These symptoms increased, and she died Nov. 15th.

Sectio Cadaveris.—Forty-eight hours after death.

Both lungs anteriorly were emphysematous in the highest degree, presenting numerous bullæ, with deep fissures between them, with patches of collapsed lung here and there. If anything, the left lung was most affected. Posteriorly, both lungs more or less collapsed, and on section, the lining membrane of the bronchi was deeply congested, and the tubes, on pressure, yield an abundant muco-purulent discharge. Spleen small, weighing one ounce and a half; brain and other organs healthy.

Commentary.—This woman came into the ward on the same day as Case CXCI., the fever was equally severe, and if anything, the headache was more violent. It was resolved to give quinine in one case and treat the other in the usual way. It so happened that both died.

Case CXCIX.*—Margaret Menzies, æt. 16, servant—admitted December 28, 1851. Seized with lassitude and febrile symptoms on the 22d, but without distinct rigors. On admission, pulse 100, full; tongue coated; headache and vertigo; skin dry and hot, with rose-coloured elliptical spots scattered over the abdomen and chest, which appeared this morning; they are of mulberry colour on the arms. *January* 1*st.*—Urine loaded with lithates; eruption disappeared; skin cool; pulse natural. *Jan.* 3*d.*—Convalescent.

Case CC.*—Christina Swan, servant, æt. 25—admitted December 16, 1851. Had rigors on the 14th, followed by febrile symptoms, but had headache and other premonitory symptoms on the 11th. The day before admission (15th) an eruption appeared on the body. On admission, pulse 120, small; tongue florid at edges, furred at the sides; no appetite; great thirst; cough. The entire surface is covered with a mulberry-coloured eruption, in small crescentic patches, and though not raised, strongly resembling that of rubeola. Eyes red and suffused, not sensitive to light. *December* 19*th.*—Was delirious last night. Mouth and teeth covered with sordes; tongue dry and cracked; is now insensible; pulse 120, small. Subsultus tendinum, bronchitis on both sides, with pneumonia in lower half of right lung. *Dec.* 25*th.*—Since last report, constant low delirium, which to-day is somewhat diminished. Cough and expectoration very troublesome. Absence of respiration from right back, with pealing vocal resonance. Pulse rapid and weak; eruption faded. *Blister to head. Wine* ℥vj, *and brandy* ℥iv. *Dec.* 29*th.*—No delirium, but lies in a comatose state. A lateritious sediment in the urine has appeared, and a swelling in the right parotid gland. Pulse 98, more full. *January* 1*st.*—Consciousness returning; cough much diminished, and respiration audible in right back; skin cool. An abscess forming in the neck, below right side of jaw. From this period convalescence was slowly established; the abscess was resolved, and she was dismissed February 2d.

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* Reported by Mr. J. L. Brown, Clinical Clerk.

Commentary.—This was a very severe case of typhus, with pulmonary complication, which, however, by means of stimulants liberally given, struggled through on the twenty-first day. The eruption in her case was very peculiar, closely resembling that of rubeola, which it was maintained to be by several persons who saw it. It appeared on the second day after the rigor. But there was none of the intolerance to light, or coryza of measles; and, moreover, she and her friends stated that she had previously had the disease. Under these circumstances, it is probable that it constituted the "mulberry rash" of Jenner, appearing early.

Case CCI.*—Bridget M'Fadyen, æt. 20, labouring woman—admitted December 17, 1851, with psoriasis of the arms and legs. Rigors appeared *January* 4, followed by slight febrile symptoms, which became fully established on the *10th*. *11th.*—Delirious; face flushed; pulse 120, rather strong, and jerking; no eruption. *17th.*—Quite unconscious. *Head shaved, and blister applied.* *18th.*—Head relieved; pulse rapid and weak. Ordered 4 oz. of wine. On the *24th*, sediment of lithates in urine. She gradually improved after this date, and on the 26th was convalescent. No eruption.

Diagnosis of Continued Fevers.

On reviewing the nineteen cases of continued fever previously given, with a view of determining how far we are enabled to distinguish its varieties at an early period, it will, I think, appear that this is impossible. If there be any fact connected with the disease better established than another, it is that at the onset we are unable to say whether any given case will turn out to be a febricula or a typhus, a relapsing or a typhoid fever. If you study carefully the symptoms presented by Cases CLXXXV., CLXXXVII., CLXXXVIII., and CXCIII., you will be satisfied of this. We may, indeed, when acquainted with the prevailing type of an epidemic, often be led to guess, with more or less correctness, as to its probable course, but exactitude is impossible. Should the fever cease on the seventh day, then it may be febricula or relapsing fever. The latter is determined by the return of the disease; but I know of no circumstance, beyond the type of the epidemic, which can lead us to predict that event. On the other hand, should the fever continue beyond the seventh day, then we have to do with typhus or the typhoid form. Notwithstanding all that has been said as to the means of distinguishing these varieties, by means of the eruption or of the abdominal symptoms, I believe that in practice it will be found to be impossible before the twenty-first day. We have seen, in the three cases of typhoid fever which have fallen under our observation, that no eruption existed in any of them. With regard to the ten cases of typhus fever also, in five there was no eruption (Cases CXCI., CXCII., CXCVI., CXCVII., CCI.); in three there were rose spots (Cases CXCIII., CXCV., CXCIX.); in one a mulberry or measly eruption (Case CC.); and in one petechiæ (Case CXCIV).* Then, with regard to diarrhœa, it is only diagnostic of typhoid fever after the fourteenth day. Thus, in Case CLXXXVIII., it first appeared on the twenty-eighth day, and in Case CLXXXIX., on the fifteenth. In Case CXC., on the other hand, it is said to have been present from the first, but such an occurrence, however it may excite our suspicions, is far too common in all fevers to be much regarded as more particularly indicative of typhoid than of typhus fever. From all these considerations, the distinctions which have been made out between the various forms of continued fever, are for the most part retrospective, and can only be determined in the advanced stages. It is of the utmost importance to take this into consideration, in endeavouring to estimate the value of particular kinds of treatment.

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* Reported by Mr. W. H. Broadbent, Clinical Clerk.

The same arguments which apply to the uncertainty of diagnosis, may be urged against the general doctrine, that these forms of fever are dependent upon separate poisons, run a distinct course, and are governed by laws as distinct as those which regulate the various kinds of eruptive fever. Without denying the existence of various kinds of continued fever, I am of opinion that this doctrine has not been established. On the contrary, I believe that internal complications, and the accidental circumstances of season, diet, constitution, and other causes of a like nature, modify fever in particular circumstances and at different times, and that to these the variations observed are in many cases attributable. Moreover, I am satisfied that typhoid and typhus fever may occur together epidemically, run into one another, and be mutually communicable.

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* This paragraph has been criticised by a writer in the "British and Foreign Medical Review" for October 1853, who is a strong supporter of Dr. Jenner's views. It may be worth while, in turn, to analyse his arguments. He admits that if the eruption is not distinctive, the objection to Dr. Jenner's views would be well founded. He says, however, that in Cases CXCII., CXCVI., and CCI., the eruption may have been absent, simply on account of the youth of the patients. But typhus fever frequently attacks young people, and if the diagnostic eruption can only be depended on in persons after the age of 25, its value cannot be very great. Case CXCI. is declared to be a cerebral disease, and Case CXCVII. a pulmonary one. Cerebral and pulmonary complications were undoubtedly there, but I can assure the critic that they were cases of typhus fever notwithstanding. Thus, however, he disposes of the five cases which are hostile to his views. Then, as to the three cases of typhus (Cases CXCIII., CXCV., and CXCIX.), with rose spots, he denies that such spots are exanthematous. But if not exanthematous, what are they? Certainly they were not macular or petechial. Then, because it is said in Case CXCV. that they became darker afterwards, and in Case CXCIX. it is noted they are of mulberry colour on the arms, therefore they must have presented the ordinary character of a typhus rash. All I can say is, that to me they were in no way distinctive. The absence of eruption in the three typhoid cases (CLXXXVIII., CLXXXIX., and CXC.), is thus explained by the reviewer:—"As the rose spots only appear in 85 per cent, it is not impossible that they might have been absent in these three consecutively, and may have been present in the next fifteen." But if so, how in Edinburgh, where typhoid fever is rare, is our diagnosis to be assisted by a supposed peculiar form of eruption, which need not occur in all the cases of the disease admitted into the clinical wards for perhaps twelve months?

Morbid Anatomy of the Edinburgh Epidemic Fever during the Winter Session 1846-7, *when Typhoid Disease was prevalent.*

During this epidemic, I opened the bodies of 63 individuals who had died of typhus and typhoid fever, with the following results:—

Spleen.—The organ most frequently affected was the spleen. In the majority of cases it was more or less enlarged and softened, presenting a mahogany-brown colour, and creamy consistence; so that when pressed, the whole of its parenchyma could be squeezed out of its capsule. In ten cases the spleen contained yellow fawn-coloured discolorations with abrupt margins, sometimes diffused in masses varying in size from a walnut to that of a hen's egg, at others, disseminated in miliary spots through the organ. In two cases, these altered masses of the spleen's substance had softened and burst into the peritoneum, causing fatal peritonitis. In another case, a distinct line of separation was observed to be forming round a mass about the size of a walnut.

On examining this altered texture in the spleen with a power of 250 diameters linear, it was found to consist of—1st, numerous molecules and granules; 2d, free nuclei; 3d, compound granular cells of various sizes; 4th, fragments of the fibrous tissue and fusiform corpuscles of the organ. The granular cells were frequently ruptured, more or less broken down, and appeared to me at that time to constitute the structural character of a new formation which had been described by Rokitanski and other German pathologists, as typhus deposit. This deposition, according to them, bears the same relation to the constitution of the blood in cases of typhus fever, as tubercle and cancer do to the tubercular and cancerous cachexiæ. Although the facts described by Rokitanski and others are quite correct, as well as his description of the structure of this altered tissue which I confirmed in 1846-7, further observation has convinced me that these alterations are not peculiar to typhus, and do not constitute a distinct form of exudation. They consist, in point of fact, of a peculiar degeneration of the splenic pulp, which follows a greater or less increased growth of the glandular cells, the morbid anatomy of which is displayed in a series of preparations I placed in the University Museum, where they can be studied.

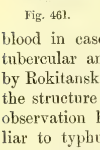
Fig. 461.

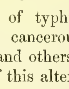
Fig. 462.

Fig. 461. Structure of a discoloured mass in the spleen.
Fig. 462. The same after the addition of acetic acid. 250 *diam.*

Lungs.—The organs most frequently affected after the spleen were the lungs. The most common lesion was bronchitis, the bronchial lining membrane being of a deep mahogany or purple colour, more or less infiltrated with serum or exudation. The fine bronchial tubes were frequently filled with a muco-purulent matter, and in a few cases were choked up with a reddish-brown gelatinous substance, more or less fluid—probably a modified form of the exudation described by Remak, as discovered by him in the sputum. The apices of the lungs were very commonly œdematous, yielding on section a copious grayish frothy fluid. In fifteen cases, the lungs were more or less consolidated by exudation, which seldom presented the characters of normal hepatization. It was sometimes of a dirty yellow tint, at others of a brownish chocolate colour, existing in masses of irregular outline, and of variable size, resembling the discoloured portions of the splenic pulp, formerly alluded to. In three cases there was pulmonary apoplexy.

The dirty yellow or chocolate-coloured exudation into the lungs was ascertained, on microscopic examination, to consist of,—1st, numerous molecules and granules, filling up the air vesicles, and infiltrated into the areolar tissue; 2d, naked nuclei; 3d, enlarged and isolated epithelial cells, with multiplying nuclei; and 4th, several compound granular corpuscles. This material was also supposed to belong to the so-called typhous deposits, but is more probably in part an altered exudation, dependent on the constitution of the blood, and partly a desquamation of the epithelium, with tendency to multiplication of inclosed nuclei.

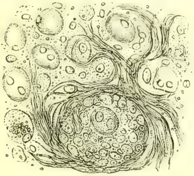
Fig. 463.

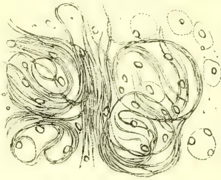
Fig. 464.

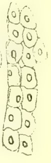
Fig. 465.

Intestines.—The intestines presented the lesion so well described by Bretonneau, Louis, Cruveilhier, and others (dothinenteritis, typhoid ulcer, etc.) in nineteen cases. It consisted of a peculiar alteration of the round and oval glandular patches of the small intestine, exhibiting in its first stage a flesh-coloured mass, raised above the mucous membrane, presenting in the round patches the form of a pimple, or a split pea, and in the oval ones an abrupt elevation, resembling an inverted

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Fig. 463. Appearance of exudation and epithelial cells in the lung in a case of typhoid pneumonia.

Fig. 464. Another portion of the same lung, after the addition of acetic acid.

Fig. 465. Portions of normal epithelium separated from the air vesicles. 250 *diam.*

dish. In the second stage this mass was more or less softened, especially round the edges, exhibiting a tendency to separate and slough. In the third stage, the slough had separated, leaving an ulcer, with abrupt edges, equal in area to the size of the gland affected, but varying in depth, occasionally passing through the muscular, and resting on the peritoneal, coat of the intestine. In this latter case, the peritoneum externally often presented a red or violet patch of congested vessels, indicating the ulcer below. The elevated patches were observed occasionally to extend as high as the duodenum, and as low as the rectum. In one case numerous dothinenteritic elevations, about the size and shape of a split pea, extended all over the ascending and transverse colon. In a few cases the isolated follicles in the large intestine were observed swollen and empty, presenting in their centre a dark blue or black spot. In others, the round and oval patches of the small intestine exhibited a grayish or slate-blue appearance. Perforation of the intestine from ulceration, causing fatal peritonitis, occurred in three cases. Dysentery, with flakes of lymph attached to the mucous surface over the ascending and transverse colon, was associated with intense dothinenteritis in one case. Oval and round cicatrices, exhibiting different stages of the healing process of the intestinal typhous ulcer, were observed in two cases.

On examining the matter found in the intestinal glands in the above cases, it was found to consist of numerous molecules and granules, associated with free nuclei and cells of the glandular sacs, which were unusually distended, and filled with cell elements, in various stages of development and disintegration. In this respect it closely resembled the altered substance of the spleen, formerly described, and indeed appeared to consist of the same glandular lesion.

Mesenteric Glands.—In all the cases where the intestinal ulcerations were recent, the mesenteric glands were enlarged, soft, and friable, and of a grayish or reddish-purple colour. Some of these glands reached the size of a hen's egg. On section they presented a finely granular surface, of a dirty yellow-grayish or dark fawn colour, and their substance was generally soft and friable, but sometimes, in one or more parts of the swollen gland, broken down into a fluid of creamy consistence.

On examining this creamy matter, or the fluid squeezed from the gland, with a power of 250 diameters linear, it was found to contain numerous cells, generally spherical, varying in diameter from the 1-150th to the 1-35th of a millimetre. In some cases numerous nuclei were contained in the cell, occupying three-fourths of its interior, generally about the 1-200th of a millimetre in diameter. At other times from one to four of these nuclei were seen scattered within the cell. On the addition of acetic acid the cell-wall was rendered very transparent, whilst the nuclei were unaffected. Many of them were free, and at first looked like altered blood corpuscles, from which they were at once distinguished by the action of acetic acid. (See Figs. 192 to 194, p. 181.)

Blood.—The blood, in the great majority of cases, was fluid, and of a dirty brownish colour. In those instances, however, where the disease had been protracted, and especially in such as presented well-marked glandular disease, firm coagula were found in the heart and large vessels.

Other Lesions.—With regard to the other lesions observed in the 63 bodies, it may be said that in two there were glossitis, and laryngitis with tonsillitis; in one, abscess of the kidney; and in one, abscess of the posterior mediastinum. The brain did not appear to participate much in the disease. It presented only occasional congestion, with slight effusion into the subarachnoid cavity, or into the lateral ventricles. In seven bodies no lesion whatever could be discovered.

Such is a summary of the appearances observed in sixty-three bodies of patients who died of fever during the prevalence of the typhoid form of the disease, during 1846-7. The proportion of typhoid to typhus cases I have now no means of ascertaining. On the whole, however, the account given is a faithful description of the frequency with which the individual lesions occurred, and of their minute structure.

With regard to the nature of typhoid, as of all other forms of fever, we know little; but, from what has been said, it is impossible to avoid seeing, that the spleen, mesenteric and intestinal glands, are especially liable to be affected. Now these glands constitute part of an apparatus which, I believe, secretes the blood (See Leucocythemia); and if so, we begin to catch a glimpse, at all events, of the connection between alterations of these structures and of the blood in fever. Further researches, however, are required to determine the nature of this connection, as well as how far in this disease the glands operate upon the blood, and the blood upon the glands.

Of the numerous questions which will be found discussed in systematic works relating to the pathology and mode of propagation of con-

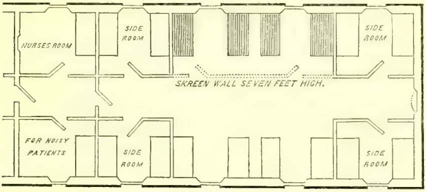

Fig. 466.

Fig. 466. A clinical ward of the Royal Infirmary in 1817, 60 feet by 24, showing the arrangement of fever beds, and the screen which isolated them.—(*Christison.*)

tinued fever, I shall only allude to one, namely, Whether it be or be not advisable and right to admit cases into a general ward of a hospital. My reply is decidedly in the affirmative, being satisfied it is far better in every point of view to dilute the contagious element, rather than to concentrate it by providing special wards for typhus cases. Previous to 1825, a few fever cases were treated in each clinical ward of this Infirmary without injury to the other patients, the disposition of the fever beds being represented in shadow, in Fig. 466. The space around them was partially isolated by a screen partition, seven feet high, with a door at each end. At present the arrangement of fever beds in the clinical wards is represented Fig. 467. Each bed has 1100 cubic feet of space, and 8½ feet of head room. There is a window on each side of every fever bed, and a space of six feet between it and the adjoining ones. The result of this system has been most satisfactory, as during the last ten years there has been no spread of fever in the wards, except on one occasion, which was traced by Dr. Christison to the rules of the house having been neglected.*

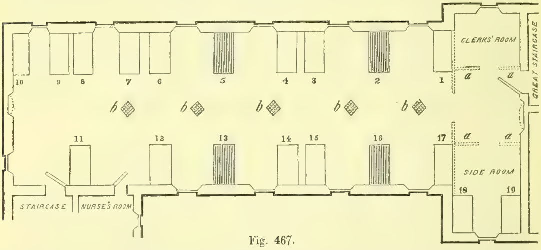

Fig. 467.

Treatment of Continued Fever.

The general treatment of continued fever which I have found most useful, and which you have seen practised in this Infirmary, consists, during the stage of excitement, of giving saline antimonials, administering slight laxatives if occasion require them, and ordering the head to be shaved and cold applied. Wine and stimulants are required at a later period when the pulse becomes weak. In prolonged cases, the effect of pressure on the skin from decubitus must be carefully guarded against, whilst the different complications which arise will require careful management.

* Monthly Journal of Med. Science, March 1850.

Fig. 467. Clinical ward, No. XI., 1858, 81 feet by 24, showing the present arrangement.—(*Christison.*)

Salines and Laxatives.—At an early period of the disease, when the skin is hot and the pulse rapid and strong, the saline mixture generally ordered is the following:—℞ *Sol. Tart. Antim.* ʒss; *Liq. Ammon. Acet.* ℥ij; *Aquæ*, ℥vss; *M. ft. Mist.*, a table-spoonful to be taken every four hours. Should a laxative or purgative be required, not otherwise, castor oil is the one usually employed. Water or thin lemonade may be taken *ad libitum.*

Cold to the Head.—The oppressive headache of fever is greatly alleviated by cold applications to the head. Indeed none but those who have experienced it can understand the feeling of relief and grateful sensation of ease which is in this way produced. The best method of applying cold I have found to be as follows:—A wash-hand-basin should be placed under the ear on one side, and the head allowed to fall over the vessel by bending the neck over its edge. Then from a ewer a stream of cold water should be poured gently over the occiput, and so directed that it may be collected in the basin, care being taken not to wet the dress or bed-clothes. It should be continued as long as it is agreeable to the patient, and repeated frequently. In hospitals, and more especially in fever-wards, this method requires too much attendance. You will have observed, indeed, that I seldom ordered cold to the head, experience having taught me that it was more frequently converted into warmth to the head. For notwithstanding every injunction to the contrary, all that is done in these cases is to moisten a piece of double rag or lint in cold water, and lay it upon the warm head of the patient. In a few seconds it is converted into a warm and steaming fomentation, and too frequently allowed to remain in this condition for hours. Hence, unless cold can be applied properly (and in large hospitals that can scarcely be expected without procuring a nurse for every two or three patients) it is better not to order it at all. It has occurred to me, however, that a water-pipe might be conveyed round the walls of fever-wards, with a vulcanized india-rubber tube and stop-cock attached, so that with a little contrivance the patients might procure a flow of cold water and regulate it for themselves. I am satisfied that much relief would be in this way obtained.

To secure the application of cold efficiently, it is necessary that the head be shaved. In all severe cases this is indispensable. Such practice, however, is often stoutly opposed by the friends of young women, who are unwilling that they should lose a handsome growth of hair. I have occasionally compromised the matter by allowing the long hair to float in cold water, and act by capillary attraction on the scalp, so as to keep up a refreshing feeling of coolness.

Wine and Stimulants.—When after being rapid and strong, the pulse falters, becomes soft and weak, very often without losing its frequency, it will become necessary to administer wine or other stimulants. The quantity of wine usually given is from three to six ounces a-day; but in some cases marked by unusual depression, or when the individual has been previously accustomed to alcoholic drinks, a larger quantity, or instead, from one to four ounces of spirits may be required. Nothing is more difficult than to lay down rules as to the extent to which stimulants ought to be given in certain cases, or as to the period when they should be administered. The pulse, strength of constitution, previous habits of the patient, but above all the type of the prevailing epidemic, must be your chief guides. Nothing, perhaps, is more indicative of experience and practical tact in the treatment of fever than the judicious use of stimulants in this disease, and certainly there is no other method of acquiring the necessary knowledge than that of carefully watching their effects in a large number of patients. Among all the agents at your command, there are none which will enable you to conduct a case of fever to a favourable termination more successfully than stimulants, when properly managed. Indeed, it is easy to conceive that in a disease where loss of appetite, and abstinence from food, constitute essential phenomena, a period must arrive sooner or later, when artificial support is absolutely required. You should be careful, however, not to prolong their use more than is necessary. Very singular anecdotes still linger about the clerks' rooms of this infirmary, of instances where whole bottles of whisky were consumed daily by fever patients; and where, notwithstanding their recovery, owing to some mistake in the order-book, the whisky was still supplied, and disappeared with surprising regularity.

Regulation of the Diet.—During the early period of fever, the patient generally loathes all kind of food. Care should be taken, however, that after a few days have elapsed, slight nourishment should be taken in the form of drink, and diluted milk, toast and water, thin panada or similar fluids given, with a little toast or biscuit. Should collapse come on, pains should be taken that, together with the stimulants, chicken broth or good strong beef-tea should be administered. I am inclined to think that the danger from fever is not from over, but from under, nourishment, which, by reducing the strength, leaves the patient less capable of struggling with the subsequent collapse. I have especially noticed, with regard to relapsing fever, that those who have fed well in the interval, have been less affected by the re-accession. The body is also drained of its saline constituents, whilst such as enter with the food are cut off; hence I have found it useful to add a large amount of common salt to the beef-tea, which also renders it more sapid and agreeable to the patient, and serves to clear away the accumulation of fur and sordes that gather about the mouth. On the other hand, when convalescence comes on, we should take care not to indulge the appetite too much.

With regard to the complications of fever, I have nothing further to say, than that they must be treated according to circumstances, always keeping in remembrance that active depleting means are never useful, and seldom fail, by diminishing the vital powers, to augment the collapse and increase the danger.

Can we cut short a Continued Fever ?—There can be little doubt that it is of immense importance to cut short the disease, if possible. Without speaking too positively, I have been induced to believe in this possibility, under certain circumstances, by means of emetics. A fortnight after being appointed Physician to the Fever Hospital of this city, in 1844, I experienced lassitude, headache, and that peculiar cold feeling in the back, which generally usher in fever. I took an emetic of antimony and ipecacuanha, and on the following day was well. Three weeks afterwards, I experienced the same symptoms ; but thinking it possible that, after all, the emetic had not really been the cause of their removal, I allowed the disorder to proceed, which terminated in a prolonged relapsing fever, with three distinct relapses. I think I have observed the same thing in other cases ; and now, as a rule, whenever called in at the early period of fever, I always order an emetic. This practice, so far as I have observed, never does harm, often good ; and, although the point is of course impossible to demonstrate, it has, I think, been successful in checking at the onset many cases of fever.

With regard to cutting short continued fever by quinine, as contended for by Dr. Dundas, I regret to say that the trial you have seen made of it has entirely failed. In none of the seven cases (Cases CLXXXVIII., CLXXXIX., CXCI., CXCII., CXCIII., CXCIV., and CXCV.) in which it was given, notwithstanding the physiological action of the drug was well marked, did it in any way shorten the disease, or produce on its progress, so far as I could ascertain, any amelioration whatever. On the other hand, it may be argued that in one case (Case CXCI.), it was injurious, by increasing the cerebral complication. Dr. Christison also tried it in one case, and Dr. W. Robertson in eight cases, both with a want of success. Thus, in sixteen cases it has been carefully and energetically tried, with uniform failure in all.

Therapeutic Action of Quinine in Fever.—The effects produced by large doses of quinine are worthy of observation. With these I became first familiar in the wards of M. Piorry, in La Pitié Hospital, Paris, during the year 1838. At that time quinine was given in enormous doses, with a view of cutting short intermittents, and diminishing the size of the spleen. In this way I frequently saw 50 grains of quinine or 100 grains of salicine given in one dose, the administration of which was followed by the same effects you have observed to follow repeated doses of 10 grains in the Royal Infirmary. In both cases the principal phenomena induced are vertigo, dizziness of vision, ringing in the ears, often complete deafness, with confusion of ideas, occasionally coma with contraction of the pupil. At the same time the force and frequency of the heart's contractions are diminished, and the pulse, from being 120, strong and full, was frequently reduced in a few hours to 80 beats, which were soft and even weak. The skin at the same time becomes cool and often moist from slight diaphoresis. This sedative action on the heart is apparently the result of the comatose condition produced by the primary action on the brain, as is proved by the fact that the disappearance of the cerebral induces cessation of the circulatory phenomena. In large doses, therefore, quinine is a narcotic. At all events, its principal action seems to be on the nervous system, through which it seems to operate on the blood-vessels and blood. Of late years it has been called an anti-periodic, from the specific effects it exercises, not only on intermittents, but on all diseases which exhibit a tendency to return at periodic intervals, as certain cases of epilepsy, neuralgia, and even relapsing fever. This property is altogether peculiar, and is distinct from what ought to be understood by febrifuge, unless indeed the statements and views of Dr. Dundas should be subsequently confirmed.

Quinine is also spoken of as being a tonic when given in small doses. This property seems to have been attributed to it on account of its bitterness, as well as its remarkable effects in the cure of ague. But whether it increases the appetite, stimulates the digestive organs, or in any other way operates by increasing the tone of the system and improving the nutritive powers, is a circumstance which, though generally adopted as true, admits of strong doubt. If quinine be a narcotic in large doses, it is the only one of that class of remedies which is tonic in small doses. No doubt it is very frequently given to convalescents and weakly persons, who get better under its use, but whether this is owing to the quinine, or would not have occurred equally well without it, is a matter very difficult to determine. Of one thing I am satisfied, namely, that it is far inferior in tonic properties to many metallic and other vegetable drugs, and, consequently, a medicine with such known valuable anti-periodic properties, the supply of which also is yearly diminishing, should not be wasted in endeavouring to produce effects so very doubtful as the tonic virtues which have been ascribed to it. For many years, therefore, I have not given quinine as a tonic, and have yet to meet with a case where it is necessary to administer it in order to increase the strength of the system.

REMITTENT FEVER—CAN IT BE SEPARATED FROM ACUTE HYDROCEPHALUS?

Case CCII.*—Blanche Scott, æt. 3 years, of scrofulous habit—admitted into the clinical ward November 10th, 1851. Her mother states that she enjoyed good health until a fortnight ago, when she was attacked with severe diarrhœa—the stools being thin, of a dirty green colour, offensive odour, and mingled with slimy matter. She became dull and peevish during the day, but restless and uneasy at night, when the skin became hot and the countenance flushed.. The diarrhœa and fever continued eight or ten days, accompanied with loss of appetite and great thirst. During the last four days there has been delirium; loss of consciousness; occasional moaning; uneasy gestures in demand for drink; hands frequently raised to the head, with a slight scream; constant picking of the nose and angles of the mouth with her fingers; latterly, retching and vomiting, and passage of the urine and fœces in bed.

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* Reported by Mr. J. L. Brown, Clinical Clerk.

Symptoms on Admission.—On admission she presents the following symptoms:—Unconsciousness of surrounding objects, not recognising even her mother; pupils not contractile to light; slight strabismus of right eye; frequently puts her hands to the head, which is rolled about uneasily; continual grinding of the teeth, low moaning, and occasional muttering. Tip of tongue, which is all that can be seen, very dry, and of scarlet colour; loss of appetite; constant thirst; vomiting; involuntary discharge of fœces and urine; on pressing the abdomen uneasiness evidently experienced, and moaning increased. Skin hot and dry; no eruption; a small abscess at the back of the neck, with a sanious discharge. Action of heart feeble and fluttering. Pulse 140, small, and occasionally intermittent. Breathing short and hurried; no rales. *The head to be shaved, and a blister to be applied over the scalp. To have* ℥ij *of sherry wine.*

Progress of the Case.—*November 12th.*—The fever increased towards night, and she was very restless. This morning it has abated. Skin now cool; pulse 120, stronger and regular; no strabismus; still unconscious. Pus has formed below the blistered cuticle. *Nov. 13th.*—Accession of fever last night; the pulse rising to 160, and becoming sharp. This morning consciousness has returned; fever abated; tongue dry, brown, and cracked; swallows without difficulty; pulse 120. *Nov. 15th.*—There are still accessions of fever at night, and remissions in the morning. The scalp is swollen and boggy to the touch, and pus oozes from it on making pressure. All movement of the head causes the child to cry. No tenderness of abdomen. Bowels are opened three times daily. Fœces are more consistent, of dull green colour, and offensive smell. Pulse 110, more full. Three parallel incisions were made through the infiltrated scalp, by which a considerable quantity of pus was evacuated. *To take* ʒj *of cod-liver oil three times a-day. Chicken diet. Continue the wine.* From this period she rapidly improved. The remittent fever ceased on the 18th. Extensive sinuses formed in the scalp, covering the occiput and neck, which, however, gradually healed on the application of a sulphate of copper lotion. Slight bronchitis appeared on the 25th. The appetite soon after became very good; her strength improved. The incisions in the scalp had perfectly cicatrised on the 1st of December, and on the 11th she was discharged; the abscess in the neck, however, not having quite healed.

Commentary.—In this case the fever was of a distinctly remittent type—the accessions being very marked at night, and the remissions very considerable in the morning. It commenced with intestinal, which were followed by cerebral symptoms. Was it a case of gastro-enteritis, or of cerebral meningitis, or, as these disorders are called by some, remittent fever, or acute hydrocephalus? No doubt these two separate diseases exist; but if you ask me by what symptoms you may distinguish one from the other in children at an early period, I should be at a loss to reply. In the whole range of practical medicine, this must be allowed to constitute a question of the greatest difficulty to decide. Indeed, I am inclined to consider that it cannot be done until the disease is so far advanced as to render the cerebral symptoms unequivocally predominant. In systematic works on the practice of physic, you will find the diagnostic characters of the two diseases set forth with wonderful order and propriety; but if you depend on these at the bedside, you will, in the majority of cases, be greatly disappointed.

Now, if the symptoms observed in the case before us be taken into consideration, it will be seen that they partake of the characters of both diseases. Such I believe to be really the case, the old distinctions between remittent fever and hydrocephalus having no basis on morbid anatomy. The former, however, is connected with irritation in the digestive organs, the latter with cerebral congestion or inflammation. It is clear that these two lesions may be conjoined in different cases in various degrees, and hence the different aspects presented in practice. The so-called remittent fever and acute hydrocephalus of authors, then, cannot be separated, and in most instances are mingled together. The case of Scott was one of this description, commencing with symptoms of intestinal derangement, accompanied by fever of a remittent type, complicated at a later period by cerebral congestion of an asthenic character; in short, the hydrocephaloid disease of Marshall Hall.

The treatment was in accordance with this view of the case, consisting of small quantities of wine, good nourishment, blisters to the scalp, and subsequently cod-liver oil. Several of you expressed the opinion that this was a case of hydrocephalus, and a few were inclined to give mercury. As to hydrocephalus, much depends on what is meant by that term. If by it is understood cerebral meningitis, then it was not hydrocephalus; but if it meant certain cerebral symptoms, independent of any particular lesion, then it was. Such symptoms, however, may arise from exhaustion, as well as from over-excitement, and the one we had to do with was certainly a case of this kind, coming on, as it did, after protracted diarrhœa and fever.

As to mercury, I have no hesitation in saying, had we depended on it, as some recommend should be done in similar cases, the patient would never have recovered. It has been said that mercury is the sheet-anchor of the practitioner in hydrocephalus. I have never seen it beneficial in undoubted cases of cerebral meningitis, and the diagnosis in the vast majority of instances is so uncertain as to warrant the suspicion, that the recoveries which have taken place were not those of true inflammation. In this little girl, notwithstanding the delirium, the coma, the screams, the tossing the hands towards the head, the strabismus, and the insensible contracted pupil—all of which have been placed among the principal evidences of hydrocephalus, the treatment was brought to a successful conclusion by stimulants and nourishment. I do not tell you that this will always succeed; but whenever such symptoms follow protracted diarrhœa, and are accompanied by remittent fever, I am satisfied you may place more reliance upon such treatment, aided by the powers of nature, than upon the vaunted, but in my opinion hypothetical, powers of mercury.

INTERMITTENT FEVER.

CASE CCIII.[*]—*Tertian Intermittent Cured by Quinine.*

HISTORY.—John Kelly, a labourer—admitted into the clinical ward October 20th, 1851. Had always enjoyed good health until three months ago, when he was attacked with intermittent fever in Lincolnshire, while working at the harvest. At first it assumed the quotidian type, but after three weeks it became tertian, and continued three weeks longer. Then being at Morpeth, there was an interval of a fortnight. On leaving Morpeth he was much exposed to cold and wet; the disease returned, and has continued up to the present time.

PROGRESS OF THE CASE.—The day after admission, he had a well-marked attack of fever. The cold stage continued fifteen minutes, and the hot and sweating stages three quarters of an hour, followed by languor and depression. He was ordered to take five grains of sulphate of quinine three times a-day, and a scruple of the drug two hours before the next expected paroxysm. He had two other attacks on the 24th and 26th, the latter being very slight. On the 28th there was no attack, and the scruple dose was suspended. Discharged cured November 5th.

Commentary.—The cause of intermittent fever is tolerably well ascertained. It is found in all countries which are low, swampy, and humid, and in localities where the ground is marshy, and presents a moist alluvial soil, especially in the neighbourhood of extensive woods. We must not suppose, however, that marshes and a moist alluvial soil are necessary causes of intermittent, for in India it sometimes prevails in hilly districts, at a considerable elevation, and is known by the name of hill-fever. We may therefore conclude with Dr. Fergusson, that the cause of intermittent is a condition of the atmosphere occasioned by evaporation from the earth's surface, by solar rays rather than by currents of air. The frequency of the disease during the autumn months is in favour of this theory.

The occurrence or absence of intermittent fever in particular districts, according as the circumstances just alluded to be present or absent—be induced or prevented—is another proof of its correctness. Thus it is not a common affection in Paris, but in 1838 I saw it very frequent in the wards of M. Piorry, at La Pitié Hospital. It arose among the workmen of the St. Germains and Paris Railway, who, at a particular part of the line, which was low and marshy, caught the disease in great numbers. They nearly all came to La Pitié, as M. Piorry cured the disease rapidly by large doses of quinine, and was in consequence celebrated among them; and thus, whilst numerous cases were always present in that hospital, it was very rare in Paris generally. On the other hand, there are many places in which ague was once common, where it is now rare, from the draining of marshes, or local improvements in cities. Thus it was formerly common in London, in the district which surrounded the Tower, but disappeared when the ditch was allowed to become dry. I have also been told that, in Edinburgh, when the valley which now separates the old from the new town was a marsh, ague was frequent. At present it is very rare, and never met with except in individuals who have caught the disease elsewhere and travelled to this city.

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[*] Reported by Mr. W. M. Calder, Clinical Clerk.

With regard to the nature of intermittent fever, we know nothing, although we infer that the peculiar condition of the atmosphere alluded to causes a peculiar change of the blood, on which the disease essentially depends—but the nature of that change—why it should occasion an intermittent instead of a continued effect—why it should produce in different people a quotidian, a tertian, or a quartian, etc. etc.,—of all this we are ignorant. I cannot see that its pathology has in any way been advanced, by endeavouring to connect it with diseased spleen. No doubt this organ is frequently enlarged in ague, and in chronic cases becomes hypertrophied and indurated. It is also especially liable to undergo changes of texture in continued fever, as we shall subsequently see. Piorry contends that congestive enlargement of the spleen is the primary change, and that the general fever is a result. He has brought forward numerous cases, showing that, in ague, this organ may be demonstrated by percussion to be enlarged, and that recovery is commensurate with its diminution in bulk. He cites one case where an individual was knocked down in the street by the shaft of a carriage which struck him on the left side over the spleen, and in whom the resulting fever was distinctly intermittent. This may have been a coincidence. Careful observation, however, has satisfied me that there is no uniform relation between the enlargement of the spleen and the intensity of intermittent fever, as M. Piorry supposes. We have seen that in leucocythemia the spleen has been much hypertrophied, and no ague occasioned. On the other hand, without denying that lesions of the spleen are very common in connection with ague, we are unable in the present state of pathology, to determine whether this be a cause or an effect, or to indicate why lesion of this organ should sometimes be connected with an intermittent, at others with a continued fever.

The treatment which experience has proved to be most certain and rapid, is that by quinine; and I am satisfied that tolerably large doses are more efficacious, than small ones frequently repeated. I usually give five grains three times a-day, and a scruple two hours before the occurrence of the attack, and have never seen a case which resisted this treatment. Much larger doses have been given. Thus I have seen Piorry give fifty grains for a dose, with the effect in recent cases of at once cutting it short, and rapidly reducing the engorgement of the spleen; but a permanent and quick cure I believe to be equally well effected by the medium dose formerly recommended. Quinine in large doses produces very inconvenient effects, such as cephalalgia, vertigo, tinnitus aurium, deafness, and other symptoms, which, should any cerebral complication exist, will render it fatal. During the prevalence of intermittent at La Pitié, in 1838, a man was treated with large doses of the drug, and the head symptoms attributed to its stimulant action. He died, and on examination, acute meningitis, with exudation of lymph on the membranes, was found.

Some years ago, Dr. Douglas Maclagan introduced the sulphate of bebeerine as a substitute for quinine, and at the time I tried it with great success. Of late years, however, it seems to have lost its virtues, whether from change in the mode of preparation, or otherwise, I do not know. Certainly its good effects cannot now be depended on. Salicine is a useful drug in intermittent, and from numerous experiments I saw made with it in the wards of La Pitié, in 1838, it may be depended on when given in double the quantity of quinine. In some chronic cases which have resisted quinine, arsenic has been found useful. I have frequently seen in the south-west of England, a case cured at once by a scruple of Cayenne pepper suspended in water. Indeed, a vast number of remedies have been found occasionally beneficial in intermittent fever, but there are none so uniformly successful as quinine.

ERUPTIVE FEVERS.

There are certain diseases which, in an arbitrary classification, may be considered as febrile eruptions, or as eruptive fevers. They comprehend especially scarlatina, erysipelas, variola, and rubeola. Occasionally roseola, herpes, or other cutaneous eruptions, may be attended with fever, but they are separated from the others by their non-contagious or infectious nature. Plague and glanders, on the other hand, are true eruptive fevers; and, with the others mentioned, obey certain laws, which may be shortly noticed.

1. They may be infectious and contagious. By infection is understood the power of being propagated through the inhalation of air tainted by the breath or perspiration of the affected person. By contagion is understood communication by actual contact.

2. The present theory, with regard to the cause of these diseases, is, that it depends upon a morbid poison, a small quantity of which entering the blood produces in that fluid a peculiar change which is analagous to that of fermentation. To distinguish this change in animal from what occurs in vegetable fluids, the term *zymosis* has been introduced by Mr. Farr (from ζυμόω, to ferment).

3. Some of these animal poisons, if excluded from the air, or carefully dried, will retain their communicating property for a longer or shorter time. This enables us to preserve matter for artificial inoculation. Hence also they have been supposed capable of attaching themselves to fomites—that is, substances of a rough surface or downy texture, such as wool, cotton, wearing apparel, dust, etc. It is on this theory that quarantine regulations are founded, the whole of which,

together with the facts, real or supposed, that support them, require a thorough revision.

4. All the animal poisons are distinguished by peculiarities in their mode of incubation and development. Thus a period of latency exists between exposure to the poison and accession of the fever, or first rigor. Again, the eruption appears at different periods after the fever is declared. Thus—

	Period of Latency from	Appears after first Rigor from
Scarlatina,	4 to 8 days	18 to 24 hours.
Erysipelas,	4 to 7 days	24 to 60 hours.
Variola,	8 to 14 days	48 hours.
Rubeola,	7 or 8 days	72 hours.

5. All the eruptive fevers, strictly so-called, invariably run a natural course, and cannot be cut short. It follows that—

6. The treatment of febrile eruptions has for its object conducting these cases to a favourable termination. To this end exactly the same general rules are to be followed as I previously gave when speaking of continued fever, and the same indications exist for the use of salines and laxatives, cold to the head, wine and stimulants, and regulation of the diet. These I need not again repeat, and I shall confine my observations at present to the more special treatment of the diseases we have studied in the wards.

SCARLATINA.

CASE CCIV.*—Mary Clark, æt. 17, servant—admitted 20th December 1851. On the afternoon of the 17th her throat became sore, and in the evening she was attacked with rigors, followed by pain in the head and back, and other febrile symptoms. Last night she first observed a red rash upon her chest and arms; this is of a reddish-brown colour, and resembles the ordinary eruption of scarlatina; it disappears upon pressure. Pulse 126 and feeble; fauces, tonsils, and back of pharynx red and congested; has great thirst and anorexia; tongue moist, with a white fur in middle, through which the red papillæ project; bowels costive; urine, sp. gr. 1030, contains no albumen—a deposit takes place, containing epithelial scales and crystals of triple phosphate. ℞ *Tinct. Hyoscy.* ℥ss; *Liq. Ammon. Acet. et Aquæ puræ* āā ℥iij. M. ℥j *tertia q. q. hora. Dec.* 22.—Rash disappeared from arms, but is still visible on the chest; pulse 86 and soft; less pain in the throat, although fauces and palate are still congested. *Dec.* 24.—Convalescent, and she was dismissed on the 27th of December cured.

CASE CCV.†—Isabella Husketh, æt. 22, a woman of abandoned character, and addicted to intemperance, was admitted 19th December 1851, in a state of high delirium. It was ascertained that, on the 14th, she had been seized with rigors, followed by great debility, catarrh, and general febrile symptoms. On the following day an eruption appeared on her skin. On admission, she is in a state of violent delirium, and obliged to be tied down in bed. Her eyes are suffused, and very sensitive to light; pulse 120; tongue dry and parched, florid-red at the edges, with the papillæ projecting through a white fur in the centre; teeth covered with sordes; great pain in throat, increased by swallowing; submaxillary glands tender on pressure, but not enlarged; eats nothing, but has great thirst; bowels costive; skin hot and pungent; arms and chest covered with a bright scarlet exanthematous eruption. *Six leeches applied to the throat—saline mixture.* *Dec.* 20.—Delirium continues; pulse 125; pain in throat relieved. *Vespere.*—Delirium greatly increased. *Nine leeches applied to temples, and to have a draught of morphia, and some wine.* *Dec.* 21.—Slept during night, and is nearly sensible to-day; tongue dry and florid; eruption fading; considerable sore throat. *Blister to be applied to the throat.* On the 23d the eruption had quite disappeared. The throat symptoms, however, gradually increased. On the evening of the 26th, the breathing was observed to be very short and hurried, and on the morning of the 27th the patient died.

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* Reported by Mr. W. H. Broadbent, Clinical Clerk.

† Reported by Mr. J. L. Brown, Clinical Clerk.

Commentary.—The first case is an instance of mild scarlatina, running its ordinary course, and terminating in recovery on the seventh day. The second case is an example of severe scarlatina, occurring in a woman addicted to intemperance, and in whom all the symptoms of typhus fever, associated with sore throat, were present, proving fatal on the thirteenth day. Of all the eruptive fevers, scarlatina is the most rapid in its invasion, and the most variable in its course. Great watchfulness is therefore demanded on the part of the practitioner, especially when the crisis is to be expected, so that if prostration comes on rapidly, or other untoward symptoms appear, he may be prepared to meet them. Perhaps, also, scarlatina is the most infectious of the eruptive fevers, so that complete separation of the patient from the other members of a young family is at all times to be insisted on as soon as possible.

A chief peculiarity of scarlatina is, that, in addition to the general fever and characteristic eruption, the tonsils and mucous membrane of the mouth and pharynx are also inflamed. This occasions difficulty of deglutition, with soreness of the throat, symptoms which require for relief topical remedies, such as fomentations, astringent and slightly acid gargles, or a linctus, etc. If sloughing or ulceration occur, the application of the stronger acids, or the nitrate of silver, is often necessary. The difficulty of deglutition sometimes impedes the introduction of food into the stomach, and in this way assists in producing prostration, and prevents the administration of stimulants or medicine. It may also, in severe cases, impede respiration, and assist in producing asphyxia directly. A fatal result, however, when it does occur during the primary attack of scarlatina, is generally dependent on the same causes which induce it in typhus fever—namely, congestion of the brain, as indicated by delirium, passing into coma, and followed by prostration of the vital powers. In addition to the throat complication, there are various others, all of which may require a special treatment. In the vast majority of cases, a general treatment, directed in the first place to subduing the excess of fever, and afterwards to supporting the strength, is indicated.

Many efforts have been made by different practitioners to check or modify the intensity of the disease by administering various drugs, or carrying out particular kinds of treatment. Hence, during certain epidemics, or in its visitations to particular educational institutions, various practitioners have been sanguine enough to believe that their especial mode of practice has been more successful than any other. I do not consider it necessary to direct your attention to the numerous plans which have been thus proposed, because all of them have been only partial in their operation, and no one of them has been more successful than another. You must remember that the causes of scarlatina are as mysterious and unknown as are those producing any kind of fever; and that its fatality, like that of fever, is to be traced to constitutional circumstances in individuals, to unhealthy localities, or to the so-called type of the particular epidemic. Nothing, therefore, is more difficult, under such circumstances, than to judge whether the non-fatality observed at one time, or in a certain establishment, is referable to this or that practice. At all events, I have been unable to satisfy myself that any general rule of empirical or rational practice is to be derived from the contradictory accounts which have from time to time been made public on this subject.

Dr. Andrew Wood, who has had great experience as physician to Heriot's Hospital and other educational establishments in this city, recommends the following treatment:—Several common beer bottles, containing very hot water, are placed in long worsted stockings, or long narrow flannel bags, wrung out of water as hot as can be borne. These are to be laid alongside the patient, but not in contact with the skin. One on each side, and one between the legs, will generally be sufficient; but more may be used if deemed necessary. The patient is to lie between *blankets* during the application of the bottles, and for several hours afterwards. In the course of from ten minutes to half an hour, the patient is thrown into a most profuse perspiration, when the stockings may be removed. In mild cases, the effect is easily kept up by means of draughts of cold water, and if necessary, by the use of two drachm-doses of Sp. Mindereri every two hours. In severe cases, where the pulse is very rapid—the beats running into each other—where the eruption is either absent or only partial, or of a dusky purplish hue—where the surface is cold—where there is sickness or tendency to diarrhœa—where the throat is aphthous or ulcerated, and the cervical glands swollen, then he follows up the use of the vapour-bath by four or five grain-doses of carbonate of ammonia, repeated every three or four hours. Should this be vomited, then brandy may be given in doses proportioned to the age of the patients. Carbonate of ammonia he considers to act beneficially: 1st, by supporting the powers of life; 2d, by assisting the development of the eruption; and, 3d, by acting on the skin and kidneys. Where the vapour-bath was used early in the disease, and its use continued daily, or even twice or thrice a-day, according to circumstances, he has found that the chance of severe sore throat was greatly obviated. In regard to supervening dropsy, he considers that, by the use of the vapour-bath, with the other necessary precautions as to exposure, diet, etc., its recurrence is rendered much more rare. In the treatment of the dropsical cases, it was also very useful, and in some instances might be trusted to entirely. Dr. Wood also condemns all depleting treatment, and even purgatives, during the first ten days, thinking them not only not required, but positively dangerous, as tending to interfere with the development of the eruption. In the later stages, as well as in the dropsy, however, he thinks purgatives are often beneficial.

Shortly after this treatment was proposed at a meeting of the Medico-Chirurgical Society of this city, I tried it in the case of Margaret Welsh, æt. 18, who entered the clinical ward June 29th, 1852. But the disease, instead of being shortened or rendered milder, was unusually prolonged, and was followed by rheumatism, dropsy of the inferior extremities, and by pericardial effusion. The febrile symptoms terminated by critical deposition in the urine so late as the fifty-second day. Although admitted June 29, she was not strong enough to be dismissed from the Infirmary until September 7th. This was certainly an unfortunate case to commence the trial of a new treatment; and yet the girl had been always healthy, and there was nothing to indicate at the commencement that the sequelæ would be so severe or so prolonged.

I persevered with this plan in four or five other cases, but in all of them it failed to bring about speedy resolution. At last I came to the conclusion that the heat, damp, and exposure, which it was difficult to avoid, tended especially, in the class of servants and young women who entered the Infirmary, to rheumatism. I then adopted quite an opposite treatment, kept the skin dry and cool, and have had every reason to be satisfied with the result. Several very severe cases which entered the wards during the winter and summer months of 1856-7 were treated in this way with the best results.

It has frequently been observed, that the urine in scarlatina, especially when dropsy supervenes, becomes albuminous. Dr. James W. Begbie, who has with great pains tested the urine in a considerable number of cases, considers its presence almost uniform. Aware of what he has written on this subject, I have tested the urine daily in certain cases, without observing it. This non-persistent coagulability of the urine, as well as various deposits which appear in it on critical days, must, when they occur, be considered as an evidence of the excretion of morbid products which have circulated in the blood. Hence they are common, not only in scarlatina, but in all inflammatory affections, as well as fevers. This point you must have seen me very observant of in watching for the resolution of inflammations and fever at the bed-side. —(See p. 147). It sometimes happens, however, that the critical discharge is comparatively slight, and that the organic elements are not dissolved so as to constitute fluid albumen. This appears to have occurred in the present case, for whilst morphological evidence of the crisis existed in the urine, in the form of cells and casts, it often happens that no albumen can be detected by heat and nitric acid.

Case CCVI.*—Alexander Johnston, æt. 14—admitted June 23, 1851. Three days ago he experienced distinct rigors, followed next day by a general scarlatinal eruption. On admission there was restless delirium, and constant moving of the head from side to side on the pillow. He was apparently conscious when spoken to, but could not answer questions ; the tongue was protruded with difficulty, dry, and of bright red colour, studded with florid elevations ; deglutition was much impeded ; bowels open ; pulse 130, weak ; urine voided with difficulty, and diminished in quantity, sp. grav. 1025—not acted on by heat and nitric acid ; skin hot and dry, covered with the bright-red scarlatinal eruption. *Ordered salines and slight diuretics.* He continued in the same condition, the angina increasing and the coma alternating with delirium, becoming more pronounced until the sixth day. During this period all the urine passed was carefully examined. The amount was diminished (17 oz. per day), but it was free from deposit, and unaffected by heat or nitric acid. ℞ *Sp. Æther Nit.* ʒiij ; *Pot. Acet.* ʒij ; *Tr. Colchici,* ℥ss ; *Aquæ* ℥iij. *Ft. Mist. A tea-spoonful to be taken every four hours.* On the following day all coma and delirium had disappeared. He answers questions when put to him ; skin cool ; eruption faded ; pulse 96, weak ; passed 30 oz. urine, which is turbid, with small flakes of a membranous character floating in it. On the eighth day the quantity of urine excreted was 50 oz., and it was still more loaded with sediments. On examining the urine with a microscope, it was seen to contain—1st, membranous flakes, composed of aggregated rounded particles, apparently agglutinated together, and strongly resembling some forms of vegetable tissue ; 2d, rounded and irregular masses with spicula ; 3d, amorphous molecular masses. (See Fig. 73, p. 92.) The whole of these elements, on being analysed chemically by Mr. Drummond, were found to consist of urate of ammonia. Next day the urine was only slightly turbid, and on the following one it was perfectly clear. From this time the boy gradually recovered.

Commentary.—This was a very severe case of scarlatina. The angina was intense, occasionally rendering deglutition impossible. There was delirium on the third day, alternating at night with coma, which was often profound. The worst result was apprehended. It occurred to me that the head symptoms, in this as in several cases of typhus, might probably depend not so much upon inflammation of the brain as upon absorption of, and poisoning by urea, an idea that appeared supported by the diminished quantity of the renal excretion, as well as its freedom from all deposit. Remembering the alleged virtues of colchicum in increasing the elimination of this excretion, I ordered it, in combination with diuretics, and the result was remarkable ; for on the next day not only had the fever diminished, but the urine was increased in amount, and loaded with urates to an extent and in a form I had never previously seen. It may be argued that the fever had terminated by a natural crisis on the seventh day ; but I cannot help thinking that in this case nature was assisted by the colchicum and diuretics. I have since given this medicine in various cases of uræmia, and in inflammations, where the excretion of urates should be favoured, at the period of crisis with the best effects.

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* Reported by Mr. G. Scott, Clinical Clerk.

ERYSIPELAS.

CASE CCVII.*—Marian Smales, æt. 28—admitted January 8th, 1851. She stated that, on the morning of the 6th, she was quite well, but that, after being out for some time, she felt a burning pain in her left cheek, and observed a red spot upon it. This redness gradually extended down towards the neck, and was accompanied with considerable swelling. She applied a mustard poultice to her cheek, which relieved the pain somewhat at first, but afterwards caused a great aggravation of it. On admission, besides the local pain, she complained of great thirst and of a bad taste in her mouth. The tongue was moist; bowels regular; pulse 66, full and strong. The cheek was ordered to be fomented with a lotion of lead and opium. *January 11th.*—Swelling and redness are much less, as is also the pain. *Jan. 17th.*—Redness of the skin completely disappeared. Complains only of a slight soreness in the throat. Dismissed cured.

CASE CCVIII.†—James Maclaren, æt. 59, a porter, of intemperate habits—admitted November 16th, 1851. Eight days ago was seized with rigors, followed by intense febrile symptoms, which prevented sleep. On the 13th he experienced pain in the left side of his nose, accompanied by redness of the integuments, which rapidly spread over the cheek, eye, and brow of the same side. On the following morning the redness appeared on the right cheek, and in the evening had covered the whole face. On admission there is great thirst; loss of appetite; furred tongue; hot skin; full and burning pulse, 100 in the minute; great headache, with drowsiness; tingling pain in the face, which is of a deep red colour, in some places approaching purple. The blush extends over the forehead and anterior part of the scalp, and pits on pressure. Two bullæ have broken, and recently formed scabs on the right side of nose. *Ordered an antimonial saline mixture, and the face to be dusted with flour. November 17th.* Last night there was low muttering delirium, and this morning vomiting. In the evening, pulse of the same frequency, but more soft. *To omit the mixture. Nov. 18th.*—Redness more extended over the scalp, and fresh bullæ have appeared on the forehead. Pulse 80, soft; constipation. *To have* ʒiij *of brandy daily, and to take at present half an ounce of castor oil. Nov. 10th.*—To-day much better. Pulse 80, of good strength; swelling of eyes diminished; redness fading; bullæ scabbing. From this time he gradually got well, and was dismissed cured, November 30th.

Commentary.—The first of these cases was so mild as, perhaps, to merit the name of erythema. The latter was a very severe one, occurring in a man of intemperate habits, but terminating in convalescence on the twelfth day. In this latter case a study of the symptoms will show we have again, as in scarlatina, all the phenomena of typhus fever; and when erysipelas proves fatal, so in like manner it is by coma and subsequent collapse. Erysipelas, however, is opposed to scarlatina, in being the least infectious of the eruptive fevers, in being the least fatal, and in running a much slower course. In many other respects there is a close analogy between them observable in the kind of fever, the sequelæ, and critical discharge of coagulable urine. The general indications for treatment are the same. The special treatment is directed by means of topical applications to diminish the local inflammation. For this purpose numerous remedies have been tried—such as dusting the part with flour, lotion of acetate of lead and opium, cerates, oil, etc. etc.—any of which serve the purpose of cooling the surface, rendering it more soft, and diminishing irritation.

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* Reported by Mr. T. M. Lownds, Clinical Clerk.

† Reported by Mr. A. L. Mackay, Clinical Clerk.

There can be no doubt that erysipelas is occasionally a fatal disease, from the intensity of the fever, and amount of integument involved. It is generally supposed that, when it attacks the face and scalp, it is more dangerous than when a similar amount of surface in any other part is affected. This opinion does not appear to be founded on very exact observation. Even when the scalp is extensively invaded, death from erysipelas is a rare occurrence. On going round the wards of the Hôtel Dieu in May 1851 with M. Louis, I saw several severe cases of erysipelas of the scalp, which, I was told, were under no treatment whatever,—because, as M. Louis informed me, according to his experience, erysipelas of the scalp was *never* fatal, unless it occurred in individuals of bad constitutions, or was associated with some complication. I need not say that, without forming any such exclusive opinion as this, it must be very difficult, in a disease that so generally tends to recovery, to judge how far this or that remedy is beneficial. Mr. Hamilton Bell has recommended fifteen to twenty-five drops of the *Tr. Ferri Muriatis* every second hour, as a most beneficial remedy in erysipelas. But how this medicine is more successful than the spontaneous operation of nature, it must be very difficult to demonstrate.

VARIOLA.

CASE CCIX.*—Mary Hogan, æt. 7, was admitted Dec. 9th, 1851. Never had been vaccinated. Felt slightly indisposed Dec. 4th; and on the following day complained of severe headache, pain in the back, nausea, loss of appetite, and great thirst. These symptoms continued, and on the afternoon of the 7th, a bright red blush was observed on the face and chest, gradually spreading over all the body. On the 8th the red blush became covered with numerous minute elevated papulæ; and on the 9th, when admitted, numerous vesicles could be detected on the face, arms, and legs. Tongue furred, but moist. No dysphagia. *Was ordered a purgative of sulphate of magnesia. December 10th.*—The vesicles are numerous and close together on the face, and in some places confluent. Eyelids much swollen and nearly closed. Bowels are open; pulse 140; tongue florid. The hair was cut short, and mild mercurial ointment, thickened with starch, spread over the face. She was also vaccinated. *Dec. 13th.*—Pustules fully maturated and umbilicate over the trunk and extremities. The mercurial paste forms a thick indurated crust over the face. *Dec. 15th.*—Many of the pustules all over the body have burst and discharged their contents. No constitutional disturbance. No pain or itching of the face; all swelling of the eyelids disappeared. *Dec. 18th.*—Pustules have all burst, except a few on the feet. Was dismissed, January 6th, cured. The face scarcely presented any trace of the disease, and afforded a remarkable contrast to those other parts of the skin which had not been covered with the paste.

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* Reported by Mr. J. L. Brown, Clinical Clerk.

Case CCX.*—Michael Hogan, æt. 9, admitted December 10, 1851, a brother of the former case, and also never vaccinated. Felt unwell on the 8th, with shivering, pain in the head, and usual febrile symptoms. On the next day vomited, and then observed an eruption on the skin. On admission, the face, trunk, arms, and legs are spotted with bright papules at considerable distance from each other, and he says the fever has considerably abated. On the 15th the pustules on the face were fully maturated, and here and there a few of them were observed to be confluent. On the 18th those on the inferior extremities were in the same condition. Last night he experienced again considerable headache, and to-day the pulse is 120, full; the skin hot, and febrile symptoms well developed. *19th.*—Headache violent last night, with great restlessness and insomnia; but to-day these symptoms have abated. From this time convalescence commenced, but he recovered slowly, and was not strong enough to go out until December 19th. A few pits existed on the face, where the pustules had been confluent.

Commentary.—The general treatment of small-pox is similar to that of the other eruptive fevers. There is a special treatment, however, applicable to it, which deserves some consideration.

The Ectrotic Treatment of Variola.

Various methods have been proposed, for the purpose of arresting the development of the eruption in variola, and preventing the cicatrices which are likely to form. The treatment, called *ectrotic* (εκτιτρωσκω, to render abortive), has been practised principally in France. Serres, Bretonneau, and Velpeau, cauterized each vesicle as it appeared with nitrate of silver, which immediately arrests its further progress. This is a very tedious process, while painting the surface with a solution of the caustic, causes so much pain and febrile disturbance, that it cannot be safely employed. Dr. Oliffe, of Paris, recommended the vigo-plaster of the French Pharmacopœia; and having seen, in some of the journals, that mercurial ointment, thickened with starch, has proved very serviceable in the practice of M. Briquet, and others, in the Paris hospitals, I tried it in numerous cases which have been admitted into the wards, and shown the good effects of the practice. The two cases you have just had an opportunity of observing, however, especially demonstrate this. Case CCIX. presented the most confluent form of the disease I ever saw. The entire face was so crowded with the papules and minute vesicles of the incipient stage, that there was literally not room to place a pin's head anywhere on the sound skin. It was evident that the whole surface of the face would be one mass of suppuration; and such of you as have had an opportunity of observing a similar case of the disease, must be aware of its horrible aspect, the excessive agony produced, the great swelling of the eyelids, the dreadful suppuration and fœtor of the discharge, the violent secondary fever, and the frightful cicatrices with which the countenance is afterwards covered. In this case none of these symptoms were present, and there can be no doubt that the ectrotic treatment really checked the progress of suppuration and modified the disease. From the moment the plaster was applied, all smarting and pain in the face ceased; the eyelids were never swollen; no suppuration occurred; there was no secondary fever; and on the mask leaving the face there was no pitting or suppuration. In other parts of the body the eruption passed through its usual stages, and the girl was dismissed from the house well, thirty days after the first commencement of the eruption. Considering this case was likely to be a very severe one, I felt myself authorised to use every means in my power to check the disease; and as it has been asserted that vaccination, even after the commencement of the eruption, modifies its progress, I caused the girl to be vaccinated on first seeing her. At that time the face, as we have seen, was closely covered with papulæ and vesicles; and I do not think that vaccination alone could have produced the remarkable result we have witnessed. I do not mean to deny altogether the influence of vaccination in such cases, but I have no hesitation in ascribing the beneficial result almost entirely to the ectrotic treatment.

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* Reported by Mr. W. M. Calder, Clinical Clerk.

To satisfy yourselves still more, if possible, as to the great advantage of this treatment, the case of the boy (Case CCX.) may be contrasted with that of the girl (Case CCIX.) who also had never been vaccinated. His was evidently a very mild case, the eruption discrete, and the constitutional disturbance slight. I allowed it to run its natural course, and the result was in every respect different from that in which the plaster had been applied to the face. The secondary fever was tolerably smart, the subsequent prostration proportionally severe; recovery was delayed to the thirty-ninth day, and notwithstanding the generally discrete character of the eruption, a few pits existed on the face.

Since I first practised this ectrotic treatment in small-pox, I have met with numerous instances in which slight salivation followed the use of the mercurial plaster. Dr. George Paterson* of Tiverton, however, published a case in which the salivation from the employment of the strong mercurial ointment was excessive and dangerous. I quite agree with that physician in thinking the occasional occurrence of such violent salivation would seriously compromise the otherwise remarkable advantages of the ectrotic treatment.

But it may be asked whether, after all, the mercury is in any way necessary to the success of this treatment. Its original propounders in Paris may indeed have supposed that the absorbent powers of the drug was the true cause of its success, but it seems to me that another explanation may be offered. There is, for instance, a close analogy between the mode of healing of wounds and ulcers, so well described by Dr. Macartney of Dublin—that is the so-called "modelling process,"—and what takes place in the ectrotic treatment of small-pox. In the former, cicatrices are far less liable to be produced than after healing by the first or second intention, and in the latter the pitting or cicatrization is prevented. The artificial plaster therefore takes the place of the natural scab or clot of blood, protects the parts below, and enables them to heal slowly but more perfectly than if exposed to the air uncovered and uncompressed by superjacent crusts. If this be the correct theory of the ectrotic treatment, the mercurial might be discarded, and any kind of plaster which would concrete on the face might be expected to produce the same beneficial result. This session I determined to try the effects of such a plaster, and after two or three failures have succeeded in procuring one that answers perfectly. The first case I treated with simple lard, thickened with starch and powdered charcoal, but it was so little coherent, that the patient, during the night, rubbed it off on her pillow or with her hands, and on her recovery she was pitted all over. In another case I tried carbonate of magnesia saturated with oil. But this also failed. In a third case, however, common calamine (*zinci carbonas*), saturated with olive oil (proposed by Mr. Bird, one of the clinical clerks), formed a coherent, tough crust, which remained on the face, and was found to answer well. Numerous cases of natural small-pox have been since treated in this manner with the result, not only of preventing the pitting, but of diminishing the local and general symptoms, exactly in the same manner as I have formerly detailed, as being the effect of the mercurial plaster.

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* Monthly Journal, Dec. 1852.

Dr. Wallace of Greenock, in pursuing this treatment, ascertained that the tincture of iodine, which has been recommended as an ectrotic, is of little use, and was led to employ as the best application, a solution of gutta percha in chloroform, first used by Dr. Stokes, and recommended by Dr. Graves of Dublin.

The general subject of small-pox opens up to our consideration a multitude of considerations, of which we may notice three.

1. There can be very little doubt that small-pox is again becoming frequent amongst us, a circumstance which some have attributed to deterioration of the vaccine lymph. That this cause does operate to a certain extent is very probable; but, for my own part, I have been led to the conclusion, that the terror for the disease which formerly prevailed among the public, has, through the protective discovery of Jenner, and the energy with which vaccination was originally pursued, in a great measure declined, and that this is the principal cause. At present, multitudes of the lower orders no longer have their children vaccinated, and hence why our hospitals are so frequently encumbered with cases such as those we have just witnessed. We have no remedy for this but rendering vaccination imperative by penal enactments, as is done in some continental states.

For the mode of vaccination, I must refer you to the account given in systematic works on the practice of medicine. It consists, as you know, of making a puncture just sufficient to penetrate the epidermis of the skin, and to enable the vaccine lymph to be applied to the vascular dermis. For doing this surely and rapidly, the little instrument I now show you, invented by Dr. Graham Weir,* is the best you can employ. It consists of a small handle of ivory, with four needle points projecting from one extremity, and a small curved knife for collecting and separating the vaccine matter at the other (as shown in the cut). The skin is opened by a crucial scratch with the needle points, which are held vertically, and are lightly applied, so as merely to remove the cuticle. The advantages of this instrument over the lancet are, that the operation is done more speedily, and that it opposes a larger surface for the absorption of the lymph, which is less liable to be washed away by too great an effusion of blood.

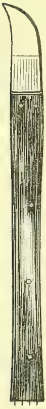
Fig. 468.

2. Sometimes small-pox occurs epidemically in a remarkably benign form. It then presents all the characters described by some authors as varioloid. Occasionally it occurs twice, or becomes what is called recurrent, and it has been known to arise frequently after vaccination. In all these circumstances, when mild, it so resembles chicken-pox as not to be distinguished from it. But more than this, it was observed in the epidemic that prevailed in Edinburgh in 1819 and 1820, that small-pox and chicken-pox existed together frequently in individuals inhabiting the same room, and sleeping in the same bed. Well authenticated cases occurred of individuals inoculated with small-pox, in whom the eruption assumed the appearance of chicken-pox; and again persons inoculated with chicken-pox had small-pox well characterised. The work of Dr. John Thomson, entitled "An Account of the Varioloid Epidemics in Scotland, 1820," contains many facts of this description, which were well known at the time, and an account of numerous experiments carried on in the Castle garrison of this place, which have never been controverted, and fully establish an essential unity in the nature of the two affections. It is evidently inconsistent to suppose that two distinct contagions should exist at the same time, each of which is protective of the other. Those who admit this doctrine must maintain that whenever the chicken-pox contagion prevailed, the small-pox contagion was excluded, or the reverse; or, on the other hand, they must admit that variola is produced by the same contagion that gives rise to chicken-pox. The work of Dr. Thomson furnishes ample proof of the correctness of the latter proposition. Dr. Gregory

* Monthly Journal, 1847-48, p. 69.

Fig. 468. Dr. Weir's scarificator for vaccination.

and others who oppose this opinion do so on the ground of the incubative stage being shorter; the whole disease less prolonged, and the constitutional symptoms being mild. These circumstances, you will observe, only point to difference of degree and intensity, not of kind. Dr. Gregory also alleges that he has seen variola occur after cow-pox, and cow-pox after variola, and therefore they cannot be identical. So far, however, does this appear to me no argument, that, if possible, it confirms Dr. Thomson's observations. The variola he speaks of occurring after cow-pox is evidently modified small-pox, and cow-pox may, in the majority of cases, be reproduced at pleasure.

3. Dr. Jenner, through life, was of opinion that cow-pox, the grease in horses, swine-pox, and small-pox, were only modifications of each other. He believed that in giving to man cow-pox, he was in reality giving to him small-pox in its primitive and mildest form. Whether cow-pox or small-pox is the original form has been disputed. It occurs to me as more probable that cattle caught it from man, rather than man from cattle, an opinion confirmed by the experiments of Mr. Ceely of Aylesbury, recorded in the "Transactions of the Provincial Medical and Surgical Association" (vols. viii. and ix.) He showed that by operating on the mucous surfaces of the animal, the cow readily receives the poison of human small-pox, which the constitution of the animal converts into the vaccine. I need not enter at length into the discussion which has been raised on this subject. Suffice it to say, that the identity of the two diseases appears to me to be established by the following incontrovertible facts:—

1. The prevalence at the same period of the cow-pox among cattle, and the small-pox among men.
2. The transmission by *contagion* of the small-pox to cattle, and the consequent development of cow-pox in these animals.
3. The transmission by *inoculation* of the small-pox to cattle, and the resulting development of cow-pox in those animals.
4. The transmission by *inoculation* of the cow-pox to man, and the development thereby of a pustule similar in character to the vaccine pock of the cow.
5. The transmission by *inoculation* of the cow-pox to man, and the consequent development of an eruption similar, if not identical with small-pox.

All these propositions have been established by numerous facts, which you will find ably stated in the "Report of the Vaccination Section of the Provincial Medical Association." See also Mr. Simon's Government Report on the "History and Practice of Vaccination, 1857."

SYPHILIS AND MERCURIAL POISONING.

Case CCXI.*—*Syphilitic Ulceration of the Face.*

Anne Bruce, æt. 24—admitted Jan. 10th, 1852. Her face presented a most frightful appearance, being covered, as well as the neck and upper part of the chest, with circular masses of pustular scabs. These varied in size, from a fourpenny piece to half-a-crown, several being in some places crowded together. Some of the prominent scabs were dry, others soft, with fœtid pus oozing from their bases. In a few places they had fallen off, exposing circular, unhealthy-looking ulcers. Wherever the skin could be seen, it was of a fiery-red colour, and puckered with old cicatrices. The lower lip was swollen and dragged downwards, and the left lower eyelid was ulcerated and everted. The metacarpal bones of the left hand were enlarged, and the skin covering them red and painful. No ulceration of the throat or other complaints, with the exception of weakness. External appearance highly cachectic.

The history she gave of her case is as follows :—About five years ago she contracted primary sores from her husband, who had suffered from a very malignant form of them in the West Indies. Shortly after, she was attacked with a minute pustular eruption of the skin. This shortly disappeared, but was succeeded by occasional blotches on the skin, which sometimes broke, but always went away slowly. Eighteen months after the commencement of the disease, one of these appeared on her chin, when being alarmed, she came to Edinburgh. The practitioner she consulted placed her under a mercurial course, and she was salivated for six weeks. The disease in the face, instead of healing slowly as formerly, now ulcerated, and began to spread. Six months afterwards, she was again salivated for four weeks, but the whole of the lower half of the face was now involved, and she entered the clinical ward of the Royal Infirmary. She is confident that these are the only occasions on which she has taken mercury. She remained in the house upwards of a month, and went out with the face nearly well, from the use of topical emollient applications, and the internal use of small doses of iodide of potassium. Six weeks afterwards, however, she was exposed to cold and wet, when the blotches, scabs, and ulcers returned in the face, and gradually spread to the neck and chest, as formerly described.

She was ordered *four grain doses of Iodide of Potassium* in a mixture containing ʒi *of Tr. of Cardamoms, and* ℥vij *of compound infusion of Gentian.* The face was dressed first with a zinc lotion, afterwards with one of chloride of lime, and subsequently with an ointment of iodide of lead. Gradually the further ulceration was checked, and the ulcers healed, so that, on the 19th of February she was so much relieved, that she insisted on going out. I saw her in the following June, with the face cicatrized all over, but quite well.

Commentary.—It is very rarely that we have an opportunity of seeing so frightful a case of mercurial syphilis as the one just noticed, which fully equalled many of the horrible representations I now show you in the work of Divergie. You will have observed from her history, that, previous to the exhibition of mercury, she was subject to the slow formation of boils, which, however, spontaneously disappeared. The moment her system was saturated with that drug, the boils and ulcers became stationary, and commenced spreading over the integument. This is an important fact too little attended to by those who practise the mercurial treatment.

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* Reported by Mr. G. A. Douglas, Clinical Clerk.

Case CCXII.*—*Syphilitic Laryngitis.*

Margaret Dickie, a staymaker, æt. 25—admitted September 9th, 1851, labouring under occasional vomiting, frequent cough, with hæmoptysis, and copious purulent expectoration. There was considerable sweating at night, and her general health, owing to want of sleep and the harassing cough, was much broken down. At the commencement of the winter session in November, I found her taking an acid mixture to relieve the sweating, a cough mixture to diminish the cough, together with cod-liver oil. The chest had also been blistered. Careful percussion and auscultation convinced me that the thoracic physical signs were perfectly normal. I then examined the fauces, which were covered with purulent mucus, but presenting here and there red and prominent follicles. The cough was also ascertained to be convulsive, the voice hoarse and broken, and, on placing the stethoscope over the larynx, a loud ringing sound accompanied the inspiration. From these facts I had no difficulty in diagnosing laryngitis; and on ascertaining that the woman was a prostitute, and addicted to drink, there could be little doubt that it was of syphilitic origin. The fauces were freely touched with a solution of nitrate of silver (ʒss to ℥j of water). This was repeated on the following day, and on the next the upper part of the glottis was touched, causing severe convulsive cough. I subsequently passed the sponge, saturated with the solution, into the larynx every second or third day during the month of November, which at first caused very severe and prolonged convulsive cough, that gradually became somewhat diminished. On the whole, however, no great amendment was produced, although the expectoration and cough during the intervals were lessened. The local applications were then suspended, but it soon appeared that they had been beneficial in checking the symptoms, from their severity again increasing, especially the amount of expectoration streaked with blood, and the want of sleep at night owing to the severity of the cough. In the second week of December, therefore, the topical applications were resumed, together with occasional blisters to the larynx, and once more a certain amount of benefit was obtained. But as this treatment, combined with the internal administration of iodide of potassium and bitter infusions, for a period of four weeks, seemed to produce no further improvement, she was dismissed on January 7th, 1852.

Commentary.—Syphilitic disease of the larynx is one of the most common of the secondary forms of the disease, as is exhibited by the generality of hoarse and broken voices among women of abandoned character. The topical treatment with the sponge, and a solution of nitrate of silver, does not seem to be so useful as in simple laryngitis; but even here its effects on the mucous membrane are evidently beneficial.

The literature of syphilis is exceedingly rich. The origin of the word, the source of the disease, the time of its appearance, its subsequent course, and the identity of its different forms at various times, have all been keenly disputed. Even at the present day, its exact nature and mode of treatment excite lively discussion; for such are the discordant facts reported, and such are the prejudices resulting from education, and *ex parte* statements, that it is extremely difficult to form an unbiassed, not to speak of a correct, opinion. All, then, that I shall venture upon, is to communicate some of my own reflections and observations on this subject.

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* Reported by Mr. C. D. F. Phillips, Clinical Clerk.

The venereal disease presents a great variety of symptoms, which are generally considered as primary and secondary. They may, with more propriety perhaps, be divided into primary, secondary, and tertiary, as follows:—

Primary symptoms—

1. Balanitis.
2. Gonorrhœa,— *Simple or ulcerative.* *Acute or chronic.*
3. Chancre.
4. Granular disease of os uteri.
5. Irritation in other organs,— *Testes*, *Prostate*, *Rectum*, *Schneiderian Membrane*, *Conjunctiva*, *etc.*

Secondary symptoms, affecting the—

1. Lymphatic glands,—*Bubo.*
2. Mucous membrane,—*Ulcerations.*
3. Skin,—*Ulcerations or eruptions.*
4. Eye,—*Iritis*, *etc.*

Tertiary symptoms—

5. Disease of bone,—*Exostosis*, *Caries*, *Necrosis.*

The forms of syphilitic disease which commonly fall under our notice, in the medical clinical wards, are such as affect the skin, fauces, and larynx. They all require the same constitutional treatment, but the two latter demand also local applications, some of which have been referred to when speaking of laryngitis.

All the different kinds of skin disease formerly described may occur in an individual affected with syphilis. They then become modified in their general appearance, course, and seats of predilection. Thus it has been observed that the red colour, such as it appears in healthy persons, assumes a darker or coppery tint. This is especially observed in the scaly eruptions, the patches of which are also smaller, while the scales are thin, and of a gray colour, often approaching black. The pustular scabs are hard and thick, of a dark greenish or black colour, furrowed on the surface, and deep in the skin. The ulcers are deep, circular, with hard and callous edges. The cicatrices are unequal, round, or spiral, white and depressed. These eruptions may occur all over the surface, but are most common on the forehead, face, nose, back, and shoulders. In children they generally assume the form of maculæ or of ulcerations; in adults, of tubercular and scaly disorders, although ulcers are also very frequent.

Diagnosis of Syphilis.

It has been said by some persons that they can readily detect a syphilitic from all other skin eruptions. But I have known errors made in this respect by the most experienced and eminent dermatologists, one of which I may relate.

A young gentleman, on rising one morning, found himself covered with an exanthematous eruption. He had dined out the previous day, and indulged in eating more than usual. He applied to an English physician practising in Paris, who pronounced it to be urticaria, recommended a dose of salts, and assured him that it would disappear in a couple of days. Some friends, however, advised him to consult M. Biett, at that time chief physician to the Hôpital St. Louis, and certainly one of the most experienced dermatologists in Paris. He did so, and the eruption was stated at once to be syphilitic, and a course of mercury recommended. It was with the utmost difficulty that his English medical adviser could prevail upon him to wait two days before commencing the mercurial treatment, when, however, he had the pleasure of seeing his diagnosis justified, by the disappearance of the eruption. Now I need not say, that if such an error could occur to one so experienced as M. Biett, how much more readily may it happen to a practitioner comparatively unacquainted with such disorders.

The same difficulty occurs with primary and secondary syphilitic ulcers. The question here is, Is there anything in the aspect of the sore itself which will enable us to determine its nature? Here, also, I have seen the greatest mistakes made by the most experienced surgeons. M. Ricord was so doubtful, after long practice, of the characters of a common chancre, that he commenced a series of inoculations to determine which was, and which was not, a true venereal sore. I am satisfied also, that individuals, whose systems have been impregnated with mercury, frequently have ulcers, which are constantly mistaken for venereal ones, although really the results of a poison with which the body is impregnated. The following case, which I observed twenty-two years ago, was the first which strongly impressed my mind with this truth.

A girl, seven years of age, entered the surgical hospital in 1836. She had a round ulcer over the tibia, about the middle of the left leg. It presented all the characters of a venereal ulcer, as described by Hunter. On inquiry, it appeared that her bowels having been somewhat deranged, the mother had gone to a druggist's shop, and asked for some opening powders. She received twelve, which contained a white, finely powdered substance. One was given morning and night. In four days profuse salivation came on. The whole dozen powders were given however, and a cachectic state was induced

Owing to some accident, she received a violent blow on the leg, and the ulcer mentioned made its appearance. There had never been a venereal taint in the family, and the parents were perfectly healthy. The clinical professor declared publicly, that had the girl been seventeen instead of seven years old, no asseverations on her part could have persuaded him that the sore was not syphilitic.

Thus, then, it is only when the symptoms arise in a certain order, that we can positively declare syphilis to be present. If an individual has chancre, which is followed by bubo, or ulcerated throat; and this is accompanied by, or precedes, eruptions on the skin, then we may feel pretty confident. Again, when deep-seated pains in the bones follow the previous symptoms, we may consider them to be syphilitic. The circumstance of an osseous disease more frequently affecting the shaft than the extremities of a long bone will serve to distinguish syphilitic from scrofulous disease, and the existence of caries in conjunction with the peculiar ulcerations formerly alluded to, will confirm our suspicions. You should remember, however, that great caution is always required. The common idea that the gonorrhœa and excoriations in men, which often follow impure connection, are a proof of disease in the female, has led to great error; as it is now ascertained that they may occasionally arise from the presence of the menses, some unusually acrid discharge, or other innocent cause. A hasty opinion given to the effect, that this or that eruption is syphilitic, has introduced discord into families, and produced incalculable mischief. The tertiary syphilitic symptoms also have frequently been confounded with the deep-seated pains of rheumatism, neuralgia, malacosteon, etc. Moreover, if such opinion leads to the entering upon a mercurial course, the original disorder is often replaced by an artificial one, not unfrequently more destructive in character, which is again confounded with syphilis, and so the error is perpetuated.

Propagation of Syphilis.

Actual contact from impure connection is the most common mode by which syphilitic sores are communicated. A gonorrhœal discharge also applied incautiously to the conjunctiva or other mucous membranes, will excite inflammation in them. The secondary forms of the disease are always the result of inoculation; but this may arise, not only from the poison being absorbed directly from a primary sore, but may be communicated by the mother to the fœtus in utero,—by the infant to the nurse,—and again by the nurse to the infant. The following case, which was most carefully investigated, and was the subject of legal proceedings, illustrates how nurses may be affected by syphilitic infants.

In 1842, the late Dr. W. Campbell brought to me a woman with a child in her arms, to obtain my opinion, whether a skin eruption on the latter was or was not syphilitic. I pronounced that it was, and that the woman should cease to nurse it, although her nipples at that time were in no way affected. The child was the offspring of respectable parents, and had been sent to her to nurse. In consequence of my opinion, the infant was returned to the friends, whose medical attendant maintained the eruption to be non-syphilitic. The woman who applied to me (nurse 1) was received as a wet-nurse into another family, and the child was sent to another nurse (nurse 2). In a week the child died; and a few days afterwards, nurse 2 was attacked with sore nipples. Nurse 1, shortly after entering her new situation, also perceived sores round her nipples; and the medical attendant of the family, after consultation with me, caused her to be discharged. She, in consequence, brought an action against the medical man, who had caused the syphilitic infant to be sent to her, and mistaken the disease. The lawyer she employed then took me to visit nurse 2, whose whole body was covered with a syphilitic tubercular eruption. Both nurses ultimately succeeded in obtaining compensation from the medical attendant.

Pathology of Syphilis.

Syphilis is caused by a poisonous virus, which, mixing with the blood, taints the constitution, and predisposes it to those forms of secondary and tertiary disorders formerly alluded to. The nature of this virus is involved in the same mystery as that of other animal poisons. All that we know of it is from observation of its effects. Sir A. Crichton, adopting Liebig's view of a catalytic action produced in the blood, pointed out, in 1842, that this catalytic action was soon destroyed in cases of scarlatina, small-pox, and similar acute diseases. Here "the fever, which destroys both the desire for food and the process of chymification, and consequently the supply of new elements for the further formation of new virus, is cut off. But in syphilis and yaws, which do not affect the brain or vital functions for a long time, the patient, by daily taking food in abundance, supplies every day new elements for the production of fresh quantities of poison, and consequently the disease goes on and is protracted indefinitely." This theory is supported by the comparatively mild character of syphilis in warm climates, where the natives live chiefly on vegetable food, and is abundantly proved by the good effects of a low diet and the most simple means, when contrasted with the effects of so-called specifics.

For my own part, I believe that the virus of syphilis, if left to itself, and the health of the patient attended to, will generally wear itself out. Unfortunately we are only commencing to observe the natural progress of syphilis, and consequently we are unable to determine how long, under ordinary circumstances, it takes to accomplish this. So far as I know, we have no specific for any kind of animal poison, for you will remember that Jenner was of opinion (and there can be little doubt that he was correct), that in giving vaccination to man, he was merely giving him small-pox in a modified form. The idea that mercury is a specific for the syphilitic poison, and the incalculable mischief it has occasioned, will constitute a curious episode in the history of medicine at some future day. It is now well known that the poison of mercury produces a cachectic disease and secondary sores in the body which have been to a great extent mistaken for those of syphilis. It consequently has happened that mercury given to cure primary sores, has produced a constitutional disorder closely resembling that of syphilis; more mercury has then been administered, increasing the mischief, and so the disease has been perpetuated. The real fact, however, is, that the syphilitic poison is no exception to the general rule, which informs us that all contagious diseases of the blood run a certain course, and that we have not yet discovered a specific cure for one of them. The great proof of this is, that the intensity of the disease in modern times has declined exactly in proportion as its treatment by mercury has diminished, and the disorder been left to follow its natural course. When we treat syphilis on the same principles that we do scarlatina and small-pox, it will prove infinitely less fatal than those disorders.

Treatment of Syphilis.

The treatment of syphilis may be said to be of two kinds, namely, the simple and the mercurial. The profession are rapidly deciding in favour of the first, although some of its members still give mercury in inveterate cases. Many of those we meet with, therefore, have taken the drug, and we have to eradicate the effects of the mineral poison as well as that of the original disease.

The *Simple Treatment* is divided into internal or medical, and external or surgical. The first consists in the observation of certain hygienic rules, and the employment of general therapeutic means. The diet must be light and mild—meat and all stimulating viands retarding the cure; even with the lightest diet, the hunger should never be quite appeased. The regimen must be the more diminished and rigid in proportion to the youth and vigour of the patient. Diluent beverages, decoctions of barley, liquorice, and linseed, alone or mixed with milk, should be taken freely, to the amount indeed of several pints a day. Perfect repose must be secured by confinement to bed. Constipation must be obviated by the use of emollient clysters or mild laxatives. The air should be maintained at the same temperature—this is an indispensable precaution in chronic, consecutive, and mercurial affections. Exercise is only useful in the convalescent stage. In chronic syphilis, however, it may often be carried to fatigue with advantage. Tepid baths, repeated three or four times a day, are always attended with advantage.

In the external or surgical treatment, strict attention to cleanliness, and the position of the diseased parts, should never be lost sight of. Emollient decoctions or fomentations, or dressings of simple cerate, are the best applications, and the dressings should not be too frequently renewed. The greatest benefit is derived from the external use of a concentrated solution of opium (in the proportion of about ʒij to ℥j of water); it soothes excessive irritability in all cases. When the suppuration is moderated and the surface of the ulcer cleansed, stimulating dressings, consisting of solutions of the sulphates of alum and copper, the nitrate of silver, and sub-acetate of lead, favour cicatrization.

In inveterate cases, more especially those labouring under tertiary symptoms, the iodide of potassium was introduced by Dr. Wallace of Dublin, and used by him with considerable success. I have myself given it in numerous cases with benefit, in doses of 5 gr., three times a-day, conjoined with emollient applications to the affected parts.

The *Mercurial Treatment* consists in keeping up slight salivation, by means of the internal administration of blue pills or some form of mercury, sometimes conjoined with mercurial frictions or fumigations, at least for the space of a month. This physiological action of the drug may be produced by administering any of its preparations continuously in small doses. If combined with opium, they act less on the bowels, and more on the system generally.

It is necessary during its action, that the patient do not expose himself to cold. A certain irritability is produced, and the constant soreness of the gums, the metallic taste in the mouth, not to speak of the inconveniences of profuse salivation which occasionally occur, render this species of treatment anything but agreeable to the patient.

Both kinds of treatment have now been extensively tested. In the year 1822, the Royal Council of Health in Sweden having been charged by the king to conduct a series of experiments upon the different modes of treating venereal diseases, reports from all the civil and military hospitals were ordered to be drawn up annually. These reports establish the inconveniences of the mercurial system, and the superior advantages of the simple treatment. In the various hospitals of Sweden, 40,000 cases have been under treatment, one half by the simple method, the remaining half by mercury; the proportion of relapses has been, in the first instance, seven and a half, in the second, thirteen and two-thirds, in one hundred. Dr. Fricke's experiments in the Hamburgh general hospital were first made public in 1828. In four years, out of 1649 patients of both sexes, 582 were treated by a mild mercurial course, and 1067 without mercury; the mean duration of the latter method has been 51 days, and that by mercury 85. He found that relapses were more frequent, and secondary syphilis more severe, when mercury had been given. When the non-mercurial treatment was followed, they rarely occurred, and were more simple and mild when met with. He tells us that he has treated more than 5000 patients without mercury, and has still to seek cases in which that remedy may be advantageously employed. He has never observed caries, loss of the hair, or pains in the bones follow his treatment, and in all such cases which have come under his care, much mercury had been given.

In 1833, the French Council of Health published the reports sent in by the physicians and surgeons attached to regiments and military hospitals in various parts of France. Some of the reports are in favour of a mild mercurial course, others in favour of simple treatment. They all agree in stating the cure by mercury to be one-third longer than by the other treatment. At Strasburg, mercury was only given to very obstinate cases. Between 1831 and 1834, 5271 patients had been thus treated, and the number of relapses and secondary affections calling for the employment of mercury has been very small. No case of caries, and only one or two instances of exostosis, had been observed. Full reliance may be placed on these facts, as regiments remain in garrison at Strasburg for five or six years.

In the various reports now published, more than 80,000 cases have been submitted to experiment, by means of which it has been perfectly established that syphilis is cured in a shorter time, and with less probability of inducing secondary syphilis, by the simple treatment.

These facts are now very generally admitted, and malignant syphilis is gradually disappearing. Twenty years ago, the most frightful secondary and tertiary cases were met with, and the usual treatment was profuse salivation. At present, such cases are rare. Abroad, owing to wise police regulations, the disease is infinitely more innocent even than it is at present in Scotland; and under the salutary influence of a mild and simple treatment, its virulence is daily abating.

In appreciating the value of this important revolution in practice, we should not forget to eulogise those who had first the boldness to introduce it. The credit of this is mainly due, in England, to Mr. Fergusson, and other British army surgeons, who practised it during the Peninsular campaign (Medico-Chir. Trans., vol. 4)—and to Mr. Rose of the Coldstream Guards (Ibid, vol. 8). In Scotland, the writings and lectures of the late Professor John Thomson of this University were mainly instrumental in convincing Scotch practitioners of the evils of mercury in venereal diseases. In England, the Hunterian theory and practice have been deeply rooted, and in Ireland have been supported by the writings of Carmichael and Collis. Mercury in consequence is still very generally employed in those parts of the kingdom. The gigantic experiments made abroad, however, ought to convince the most sceptical—if not, let him compare what syphilis is in Scotland with what it was, and especially observe that we never see an instance of the disease such as that now in the ward (Case CCXI.), unless the patient's system has been contaminated with mercury.

For an account of the treatment by inoculations, or what is called "syphilization" in Italy and Norway, I must refer you to papers by

Drs. Murchison and Lindsay, in the Edinburgh Monthly Journal for June 1852, p. 575, and November 1857, p. 407.

RHEUMATISM AND GOUT.

General Pathology and Treatment.

The present theory with regard to these affections is, that they are both connected with an increase of lithic acid in the blood. In rheumatism, this is dependent on excess of the secondary, and in gout on excess of the primary, digestion. In rheumatism, however, there is considerable excretion of lactic acid by the skin (Todd), whilst in gout there is an excess of soda, which, uniting with the lithic acid, produces a compound of lithate of soda, that may be detected as such in the blood (Garrod), while sometimes it exudes into the cellular tissue of the skin, constituting tophaceous deposits. In both diseases there is an undue balance between the excess of lithic acid and the power of excretion—in rheumatism by the skin, and in gout by the kidney. This pathology serves to explain the similitudes and differences existing between the two affections. In both there is a certain constitutional state, dependent on deranged digestion, during which exciting causes occasion local effects. These exciting causes in rheumatism are bad diet, hard work, exposure to cold and wet, and its subjects generally are the poor and labouring population. In gout the causes are good diet, indolence, repletion, or indigestion, and its subjects are for the most part the rich and sedentary. The local manifestations in both are acute wandering pains, with pain and swelling—in rheumatism of the large, and in gout of the small joints, constituting the acute attack in the one, and the so-called regular attack in the other. These are combined with a tendency to various complications of the internal viscera, which are more or less dangerous to life.

The general indications of treatment are, in both diseases, (1st) so to regulate the nutritive functions as to ensure a due balance between the amount of matters entering the blood as the result of digestion, primary or secondary, and the amount of matters discharged from the economy by the excretory organs. (2d) To conduct the acute attack to a favourable termination, carefully watching the internal viscera, and being prepared to act with vigour should these become affected. Hence the treatment of these diseases resolves itself into what may be called curative and preventive—the first having reference to the acute attack, the second to the means most likely to hinder its return; the one must be carried out by remedies which act upon the blood and excretory organs, the other by the management of diet and exercise.

Although the general pathology above mentioned, which considers rheumatism as a blood disease, may be considered on the whole as correct, we are not yet enabled to explain by it the symptoms of an acute attack of the disease, where in addition to the constitutional disorder, we have local pain, occasional heat, redness, and swelling, with febrile symptoms. Most practical men have attributed these phenomena to a superinduced inflammation, although it has not been shown that exudation occurs, or that it is followed by the usual results of that condition. Besides, its erratic character is opposed to what we know of the process of true inflammation, and calling it an unhealthy inflammation in no way clears up the mystery. The real pathology of acute rheumatism, therefore, has yet to be determined, and, as a preliminary step, a careful histological examination of the affected tissues is absolutely necessary. So far as I am aware, this has never yet been attempted, if we except some observations by Hasse on the structure of the bones in rheumatism (see Monthly Journal of Medical Science for June 1847).

Our treatment of this disease, therefore, is purely empirical, sometimes directed against the pain, at others against the supposed inflammation; now attempting to combat the pathological condition of the blood, then striving to remedy its effects by acting on the excretions, and not unfrequently giving specifics, in the hope that any change in the constitution, however produced, may be beneficial. In no disorder, probably, has such a crowd of opposite remedies and plans of treatment been extolled, and yet none of them can be depended on, so that it has been imagined that six weeks' rest is the most useful prescription (Warren). The latest author on rheumatism endeavours to explain the fact by observing, that this need not be wondered at by "those who consider the true nature of the disorder, and the variety of circumstances under which the physician may be called upon to minister to his patient's relief. The bleeding, which in the young, plethoric, and robust, may be necessary to allay excessive vascular action and cause free secretion, may in the weakly induce irritability of the heart, and a consequent attack of cardiac inflammation. The opium which in one person may prove of the greatest service in promoting free perspiration, and in allaying the general irritability of the system, may in another check the biliary and other secretions, and thus prevent the elimination of the rheumatic poison. The continued use of calomel, and the constant purging, which may be beneficial to one patient by removing large quantities of unhealthy secretions, may unnecessarily exhaust the strength of another, and tend very greatly to impede recovery. And so in regard to every remedy which has been proposed. What is useful at one time proves useless, or positively injurious, at another; and the conclusion is forced upon us, that what is wanted 'is far less the discovery of untried methods of treating disease than of discriminative canons for the proper use of those we possess;'—far less the discovery of any new medicines, than the adaptation of our present remedies to the exigencies of each case." (Fuller on Rheumatism,

p. 73). These judicious observations may serve to explain the cause of our failure ; but until we obtain more exact information regarding the *special* pathology of rheumatism, it is in vain to hope for a rational treatment.

Occasionally I have tried the effects of special remedies in this disease, and watched a series of cases, all of which were treated in the same manner. Thus I have tried aconite, and believe that alone it is of little service ; colchicum also I have given frequently, and am of opinion that in pure rheumatism it is of no advantage, although in gout it is invaluable.

Treatment of Acute Rheumatism by Nitrate of Potash.—During the session 1851-2, I made another trial of this kind with the nitrate of potash, a remedy formerly recommended by Dr. Brocklesby, and which has been given with good effect by M. Gendrin, in the wards of La Pitié in Paris, as recorded by Dr. Henry Bennet (Lancet, 1844, vol. i. p. 374). It has more lately been pressed on our attention by Dr. Basham (Medico-Chir. Trans., vol. xxxii.), who tells us that from one to three ounces of the salt, if freely diluted in water, may be taken by the patient in the course of twenty-four hours, without any injurious results, but with the effect of relieving in a marked manner the swelling, heat, and pain in the joints. In the following cases the remedy was tried in much smaller doses, and it appears to me with more than average success.

Case CCXIII.*—Mrs. Anderson, æt. 48, sick nurse—admitted December 3d, 1851. States that previous to the present attack she has always enjoyed pretty good health, with the exception of a liability to a slight cough ; has been lately subjected to much fatigue in her occupation as a sick nurse, and has been exposed to cold from sitting up for several nights in succession in a large room, heated by a fire, and ventilated by keeping the windows open. Having no adequate protection from the cold draught thus caused, she became affected with sore throat, and had pain in the chest. This occurred in the latter part of October last, and from that time up to November 20th she has suffered from slight shivering and uneasiness ; transient pain in different parts of the body ; nausea and vomiting. About a fortnight before admission, she had a distinct rigor, followed by heat of skin and other febrile symptoms, with very severe pain in the joints especially, much increased by any attempt at motion. The vomiting also continued ; and last week she suffered from pain and palpitation in the cardiac region, and at the same time an aggravation of her former symptoms. At present she cannot move without suffering excruciating agony, having severe pain apparently in every joint of the body. Heart's sounds, impulse, rhythm, and position normal ; pulse about 100, weak. Irregular fits of copious clammy perspiration, of acid smell ; no œdema of the joints. Urine scanty, dark-coloured, deposits crystals of the triple phosphates, with some mucus. Tongue loaded ; anorexia ; thirst ; occasional vomiting ; no tenderness on pressing the epigastrium ; bowels confined ; pulmonary functions normal. ℞ *Muriatis Morph. semigranum ; Pulveris Aromatici grana quinque. M. Ft. Pulv : Mittantur sex. One to be taken every half hour. Dec. 4th.*—She took three of the powders last night, after which she fell asleep ; and this morning feels somewhat better ;

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* Reported by Mr. William Broadbent, Clinical Clerk.

she has also had the bowels emptied by an enema, and is now using a diuretic mixture. *Dec. 5th.*—Pains in limbs much the same; gets no sleep; perspiration still copious; urine not increased in quantity; vomiting continues; has been taking diuretics and Dover's powder. *Dec. 6th.*—Had an exacerbation last night, the pain in the joints and limbs being excruciating. ℞ *Potassæ Nitratis semiunciam; Aquæ uncias sex. Misce et signetur—a tablespoonful every four hours. Dec. 7th.*—Has taken three doses of the medicine; she perspired a good deal during the night; urine not increased in quantity; pain is less severe. *Dec. 8th.*—Still sweats a good deal; pains much the same as yesterday. *Adde misturæ Nitratis Potass.*, ʒj. *Dec. 9th.*—Pains better; copious perspiration; urine increased in quantity; increase of the nausea and vomiting and of the thirst. *Dec. 10th.*—Pains nearly gone; sickness continues; refuses to use her medicine; pulse 80, weak; much general debility. After this date the pain ceased entirely, and she was shortly afterwards discharged cured.

Commentary.—This was a severe case of both general muscular and articular rheumatism, of a fortnight's standing, when she entered the house. There was still, however, great pain on the slightest movement, which, during two days, in no way yielded to morphia, diaphoretics, and diuretics. On the exhibition of the nitrate of potash, profuse diaphoresis came on, which was apparently kept up by the medicine, with marked amendment to the rheumatic pains, followed by rapid recovery. The improvement could not be attributed to the occurrence of any critical day in this case; and the night previous to the exhibition of the remedy, there had been a marked exacerbation. Every one who saw this case felt persuaded that the good effects were attributable to the nitrate of potash.

Case CCXIV.[*]—Jane Irvine, æt. 17, servant—admitted 19th December 1851. States that seven days ago, whilst engaged at her usual occupation, she was suddenly seized with severe febrile symptoms, and constant pain in the left ankle, which was increased by pressure and motion; it was red and tumefied. On the following day the right ankle became similarly affected, and then in succession the knees, shoulders, wrists, and fingers; the pain still continuing, but modified in severity in the parts first attacked. She has been undergoing treatment by diaphoretics, without, however, having experienced any relief from them. On admission the pulse is 100, full and soft. A soft bellows murmur, synchronous with the radial pulse, accompanies the first sound, heard loudest at the base, and is propagated along the course of the large arteries. Cannot sleep from the pain, which is general, and is causing intense suffering. Tongue moist, preternaturally red at the tip and margin; no appetite; thirst, nausea, and vomiting; the bowels are costive; some tenderness on pressure in the epigastrium. Urine high coloured, deposits a slight sediment of lithates. Skin moist, from copious perspiration; knees and ankles are swollen and painful on the least pressure. The right wrist, especially near the metacarpal bone of the thumb, is at present the seat of greatest suffering, and is red, painful, and swollen. *Ordered to be bled to* ℥xvj, *and to have a purgative enema. December 20th.*—Is much worse to-day; the pains in the wrist and hands are especially aggravated. Copious perspiration still continues. ℞ *Potass. Nitratis*, ℥ss; *Aquæ*, ℥vj. *A table-spoonful every four hours. Dec. 21st.*—Slept during the night. The sweating is still profuse. Urine in moderate quantity, sp. gr. 1016, deposits lithates. Pulse 90, weak; cardiac murmur very indistinct. The pain is considerably relieved, except in the left lower extremity. *Dec. 22d.*—Still continues taking the Potass. Nit.; the improvement more marked, and she can allow the limbs to be moved about to-day. *Dec. 23d.*—She presents quite a cheerful appearance to-day, and is entirely relieved from pain; all the joints can be moved quite freely, without exciting uneasiness. Pulse 68; skin cool; tongue clean; appetite returning; bowels regular; urine natural—some sediment. Cardiac murmur is more distinct to-day. Convalescence proceeded satisfactorily from this date till January 5th, when she was attacked by typhus fever, from which, however, she ultimately recovered, and was dismissed well.

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[*] Reported by Mr. J. L. Brown, Clinical Clerk.

Commentary.—This was also a very severe case of general rheumatism, which was in no degree benefited by diaphoretics, and a large bleeding on the seventh day. On the eighth day she was if anything worse, and then nitrate of potash was given, producing marked relief on the following day. On the eleventh day of the disease, and third from the exhibition of the salt, the disease was subdued, and she became convalescent. Here, again, the period of improvement cannot be confounded with critical days, and strictly corresponds to the administration of the remedy. The bleeding *may* have assisted its effects, but certainly was not followed, as is usually the case, by any evident amelioration. This girl had an endocardial murmur on admission, which continued during the progress of the case, and I ascertained from the medical practitioner who sent her into the house that she had laboured under this before the attack of rheumatism came on. Was this, therefore, an anemic murmur independent of the general disease, or produced by it? We may ask another question, viz., Are all the endocardial murmurs occurring in conjunction with rheumatism caused by endocarditis, and attributable to the rheumatic diathesis? These questions demand more careful attention to these murmurs in young women than has, I think, hitherto been paid to them. For my own part, I am satisfied that these anemic murmurs in young girls are very common, and that they have frequently been mistaken for sounds dependent on endocarditis. As the patient becomes more robust these murmurs disappear, and hence, probably, has arisen the idea of the good effects of mercury when given in such cases.

In a large number of cases which I have subsequently treated with nitrate of potash, I have satisfied myself that the disease is more readily subdued by this treatment than by any other I have tried.

Treatment of Rheumatism by Lemon-Juice.—In four cases in which lemon-juice was given, although in two six ounces and in one nine ounces were taken daily, it did not appear to me that the disease was in any way controlled or alleviated by the remedy. In one case six ounces were taken daily without any effect, and then the quantity was increased to nine ounces daily, until the 21st day of the disease, when sweating and resolution of the symptoms followed, more from natural crisis, perhaps, then from the effects of the juice. In a second case the remedy was continued for ten days, and until the 21st day of the disorder was fairly passed. Then nitrate of potash was given, with the immediate effect of relieving the symptoms—although here also it is not improbable that a natural crisis of the disease was being established. In any case the inefficacy of the lemon-juice appeared manifest. The third and fourth cases were those of sub-acute and erratic rheumatism, which also resisted the lemon-juice; the first for a month, the second for four days. On the whole, this trial of the remedy was in no way favourable, and was strongly contrasted with the good effects of nitrate of potash previously recorded.

CASE CCXV.*—*Rheumatic Iritis, following Acute Rheumatism—Recovery.*

HISTORY.—John Duffy, æt. 25, Ordnance surveyor—admitted April 6th, 1857. Three weeks before admission, when in the pursuit of his occupation, he got wet, and a day or two afterwards was seized with rigors followed by febrile symptoms, pains in all his joints, and swelling of both knees, and of the left elbow. After being in bed a fortnight and treated medically, he entered the Infirmary, where he took Pulv. Doveri and Tr. Colchici internally, and had Tr. Iodini applied locally. On taking charge of the case in May I first administered Nitrate of Potash; subsequently he was ordered warm baths, and then quinine with wine and generous diet, under which treatment he became much better. Chronic pains, however, still continuing to linger about the joints, and especially the knees, cod-liver oil was ordered on the 25th of May, both internally and externally, and the quinine was discontinued.

OCCURRENCE OF IRITIS, AND PROGRESS OF THE CASE.—*June 7th.*—For three days has had slight redness of the conjunctivæ, with watering of both eyes, for which he was ordered a zinc lotion. *June 9th.*—Conjunctivitis on the right side increased, and a small blister was applied over the right temple. *June 10th.*—Frontal headache. The conjunctiva, immediately around the cornea, is surrounded by a zone of straight vessels radiating outwards. Inferior half of conjunctiva of uniform red colour. To be cupped over right temple, and ℥v of blood extracted. Extract of belladonna to be applied externally round the eye. *June 11th.*—The whole of right conjunctiva of a deep uniform vermillion, and zone of vessels round the cornea of a darker shade. Atropine to be dropped into the eye to ensure dilatation of the pupil. To wear a large shade. *June 13th.*—Yesterday a weak lotion of Alum (gr. iij to ℥j of water) was applied, but has caused much irritation. Inner margin of iris thickened and irregular, pupil dilated. Discontinue lotion, apply belladonna externally, and a warm poultice over the eye at night. *June 14th.*—To-day, iritis and conjunctivitis have appeared in the left eye. Much pain in head, and restlessness during the night. Appetite bad; tongue coated; pulse 76, moderate strength. *To have Quininæ Sulph.* gr. iij *three times a-day.* To go into the side-room, and the window to be obscured. *June 17th.*—Left conjunctiva now of as uniform redness as the right, and iritis well developed; pupil, however, more dilated. Belladonna has been applied round both eyes. Last night had ℥j of Castor oil, which not having operated, was ordered to-day, *Ol. Croton. gutt. unam et Ext. Colocynth.* Co. gr. x. *June 20th.*—Both irides, which naturally are of a light-blue colour, present a dark, dirty green colour. The pupillary margins are thick, and that of the right side irregular, especially at one place where an adhesion has formed. Both conjunctivæ are of a uniform dense vermillion colour. There is considerable pain in the head, photophobia and lacrymation. *Discontinue quinine.* ℞ *Pulv. Cinchon. Rad. et Pulv. Sodæ Bicarb.* āā gr. v, *Ft. pulv., to be taken three times a day. July 7th.*—To-day the right eye is much improved, redness of conjunctivæ diminished, adhesion of pupillary margin disappeared, and vision perfect. Left eye the same as before, but an adhesion has formed, which has rendered the pupil irregular for some days. Cephalalgia has been sometimes better, sometimes worse. Belladonna has been constantly applied. *Applicent. Hirudines* iij *tempor. sinist. July 14th.*—The right eye is now quite well. Left eye appears if anything worse. The pupil is dim, greatly contracted, and its margin much thickened. Vision also is nearly gone; he sees as if through a thick cloud. *Applicent Hirudines* ij *tempor. sinist. July 22d.*—The leeches, he says, relieve the frontal pain, and they were again applied yesterday. To-day conjunctivitis less, and evident improvement; pupil larger; vision clearer. *July 28th.*—Since last report the morbid appearances in the eye have gradually disappeared. Two leeches have again been applied, and a blister to the neck. General health much improved, although still weak. *August 10th.*—Has been quite well for some days; vision in left eye is still slightly dim, but is getting clearer daily. Dismissed.

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* Reported by Mr. Stewart Lockie, Clinical Clerk.

Commentary.—This case of double rheumatic iritis, with conjunctivitis, was of the most severe description. So much, however, has been said about the danger of allowing such cases to run their natural course, and of the necessity of treating them with specifics, more especially with colchicum and mercury, that I resolved to treat this case without them. It was watched on this account with great interest by the clinical class, especially as it was seen from time to time by my friend, the ophthalmic surgeon to the Infirmary, who predicted the worst consequences. Yet notwithstanding the weakened condition of the patient when iritis came on, the severity of the disease in both eyes, and the apparent closure which was about to take place in one pupil, I persevered, and the result in perfect recovery justified my expectations. It may be argued, however, that the case would have got well much sooner if mercurials had been given. It is very difficult to determine this point, because few oculists have informed us what is the ordinary course of a severe rheumatic iritis with conjunctivitis. According to Wharton Jones,* if taken in time before much exudation has occurred, and properly treated, it *may* be cured in three or four weeks. What are called active remedies were not applicable in this case, even according to the principles of those who use them, and the amount of exudation was considerable. The complete recovery of the right eye, therefore, in five weeks, and of the left eye in six weeks, seems to me to have been on the whole a short period, considering all the circumstances, although, on this point, further observations are required. In the meantime, the case demonstrates that the most severe attacks of rheumatic iritis may get well, altogether independent of mercurials and active antiphlogistics. A similar conclusion had been previously arrived at by Dr. Williams of Boston, U.S., from a pretty extensive field for observation. (See p. 288.)

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* Ophthalmic Medicine and Surgery, p. 150.

CASE CCXVI.*—*Chronic Gout with Tophaceous Deposits in all the Joints.*

HISTORY.—Thomas Burns, a tobacco-pipe maker—admitted November 4th, 1857. Says he first became ill in Glasgow about ten years and a half ago, with pain and swelling in both his big toes. Soon afterwards the ankles and knees became affected. He was confined for a month, being unable to walk, or even to put on his shoes. Since then he has had on an average three such attacks every year, spring and autumn being the worst seasons; but he has rarely been confined by them more than a week. The attacks have generally commenced with rigors, followed by more or less fever and swelling in one or other of the joints. Almost every joint in his body has suffered in this way at one time or another. At the first attack, he says, chalk stones formed in his toes, and since then they have appeared in his feet, knees, elbows, and hands. The right hand especially has been much deformed by them. He is in the habit of cutting down upon, and extracting them, whenever they approach the surface and are unusually painful. He has been twice in the Infirmary, and on both occasions dismissed relieved. The present illness commenced suddenly six weeks ago, and has more especially affected the ankles. He has undergone a great amount of treatment, having been bled and cupped, and having taken much medicine. He had been accustomed to drink a good deal of porter, as well as of spirits, until three weeks before his first admission, in June 1856, since which time he has been more temperate.

SYMPTOMS ON ADMISSION.—He complains of pain in the left wrist and both ankle joints, which latter are swollen, and pit on pressure. The joints of the fingers are nodulated and crooked, especially those of the right hand, hard to the feel, with numerous tophaceous deposits visible through the shining and stretched integument, about the size of millet seeds. The elbow and knee joints are similarly affected, with several deposits over the olecranon and patella of each limb. The toes are not so distorted as the hands. There is pain on pressure over the right lumbar region, with a slight trace of albumen in the urine. Other functions normal. ℞ *Potassæ Acet.* ʒiiss; *Sp. Æther. Nit.* ℥ss; *Tr. Colchici* ʒj; *Mist. Camph. ad* ℥viij. M. ℥j *to be taken three times a-day.*

PROGRESS OF THE CASE.—*November 25th.*—Small abscesses have appeared over the patella and heel, to which poultices have been applied. The mixture has been apparently of no service, and is to be discontinued. *Dec. 18th.*—Last night was seized with severe lumbar pain, and general febrile symptoms, and on examining the urine it was found to be highly albuminous. The sediment contained numerous epithelial cells from the kidney, with granular and desquamative casts of the tubes. ℥v *of blood to be extracted from the loins by cupping, and to have at night Pulv. Doveri* gr. x. *Dec. 21st.*—Is much better. Albumen in the urine diminished. ℞ *Ammon. Phosphat.* ʒj; *Tr. Gent.* Co. ℥j; *Inf. Gent.* Co. ℥v. M. A fourth part to be taken in half a tumblerful of water three times a-day. *Jan. 6th,* 1858.—Since last report has been comparatively free of pain and doing well, but last night was again seized with severe febrile symptoms, accompanied by painful sensations throughout his body. To-day the joints of the extremities, especially those of the hands, are very painful. *The hands to be poulticed. To have Sol. Acet. Ammon.* ʒj *every hour. Jan. 8th.*—Has been perspiring much, and is better, although pains in joints are still very severe. The poultices have brought away several fragments of the tophi near the surface. They are of a pale yellow colour, friable, and when examined under the microscope present a mass of needle-shaped crystals of urate of soda. ℞ *Ammon. Phosphatis,* ʒss; *Tr. Colchici,* ʒj; *Aquæ* ℥vj. M. *A third part*

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* Reported by Mr. Wilkes, Clinical Clerk.

to be taken three times a-day. Jan. 22d.—The pains in the joints have now been absent for ten days, and he was dismissed.

Commentary.—The above is only the second case of gout I have seen in the wards of the Royal Infirmary, and it is a matter of general observation that the disease is one from which the people of Scotland are remarkably free. This has generally been attributed to their frugal habits, but more especially to the drinking of whisky, instead of malt liquors and wines. Dr. William Budd has described gout to be common among a class of workmen on the Thames, whose occupation it is to raise ballast from the bottom of the river. "Those men," he says, "drink from two to three gallons of porter daily, and generally a considerable quantity of spirits besides." * Now, it is curious that this is what the man, whose case is before us, seems to have done, and to which habit we may fairly ascribe the occurrence of the disease. He admitted that for some years he was accustomed to drink upwards of half a gallon of porter, besides from four to eight ounces of whisky daily. There was no hereditary tendency. The numerous local attacks frequently gave rise to excretion of the morbid products by the kidneys, with all the symptoms of Bright's disease, including albuminous urine, and desquamation of cells with casts of the tubuli. In a week or so, however, they disappeared, and he enjoyed a temporary immunity from uneasiness. As to treatment, nothing seems to have been of permanent benefit, the tophaceous deposits apparently keeping up more or less irritation and tendency to local attacks, which in their turn excited constitutional ones, more especially the fever and urinary symptoms.

SCORBUTUS.

Case CCXVII.†—James Dermot, æt. 21, railway labourer—admitted May 27th, 1847. Has been working on the Caledonian line of railway for nine months, and enjoyed good health till three months ago, when he received a blow on the right tibia. This produced a sore, and an ulcer formed. His diet consisted of bread, coffee, ham, butter, and sugar; but no milk or fresh vegetables. On admission, an elliptical-shaped ulcer, about two inches in length, is seated over the middle of the tibia, covered with irregular livid granulations, and surrounded by a raised purple edge. Another ulcer, the size of a shilling, is seated below this, and a third similar one on the outside of the leg. Eighteen months ago his left leg was burnt, and over the seat of the old cicatrix a number of ulcers, similar to those on the opposite leg, exist. One of these, towards the lower part of the leg, is the size of half-a-crown, and more livid than the others, which are smaller. The gums are swollen and fleshy, but not livid. Pulse 74, soft. Bowels constipated. *To have full diet.* ℞ *Aluminis* ʒj; *Aquæ* ℥viij. *Solve Ft. Gargarisma.* ℞ *Succi limonis* ℥iij; *Sacchari* ℥iss; *Aquæ* ℥iss. M. *Sumat pro potu ex aquâ indies. June 2d.*—Ulcers looking more healthy. *Their surface to be touched with nitrate of silver. July 27th.*—Has slowly got well since last report, and is now discharged.

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* Library of Medicine, vol. v., p. 219.

† Reported by Mr. J. Robertson, Clinical Clerk.

Case CCXVIII.*—John M'Kenzie, æt. 26, railway labourer—admitted July 7th 1847. During the last two months his diet has consisted chiefly of coffee or tea, with bread, butter, and sugar, but no milk. Two weeks ago pain and swelling came on in his left leg. Soon afterwards the right leg was also affected, and both became discoloured. Epistaxis now occurred, and has continued at intervals ever since, and has been so severe during the last two days, that his nostrils have been plugged. On admission, the left leg is much swollen, and of a purple colour chiefly on its anterior and inner aspect. The right leg is similarly affected, but to a less degree. He complains of pain and stiffness in both limbs, especially about the ankles. The gums are slightly swollen and livid at the edges, but do not bleed on masticating food. Pulse 80, soft. Tongue clean. Bowels regular. To have full diet. *July 20th.*—Since admission the symptoms have gradually disappeared, and to-day he was dismissed cured.

Commentary.—During the year from October 1846 to October 1847, no less than 231 cases of Scorbutus entered the Royal Infirmary, of whom 30 also laboured under continued fever. Of the entire number nine were females, and seven died. In the previous year only one case entered the Infirmary, and in the following one only six. I myself treated between seventy and eighty of these patients, having succeeded Dr. Christison in the charge of a long shed which contained a large number of them, besides seeing others which came into my other wards. At the same period there existed a most extensive epidemic of typhoid or typhus fever, yet it is singular that the causes which produced scurvy, mostly in the able-bodied population, and especially among the class of labourers or " navvies" then working on our railways, were of a kind distinctly different from those usually giving rise to continued fever. The potato crop had failed for two successive seasons, and caused among the poorer population the consumption of a diet not only deficient in vegetables, but of milk and fresh meat also. Among the railway labourers, the truck system, and establishment of local stores, where provisions of inferior quality were given on a ruinous system of credit or exchange, greatly assisted the absence of vegetables in causing the disease. The previous winter had been severe and protracted, so that whilst food of all kinds was high priced, the work and exposure of the labouring population were unusually severe. But short improper diet, and especially such a kind as was deficient in fresh meat, milk, or vegetables, could in almost every case be ascertained to be the cause of its occurrence. Accordingly, in a large proportion of the cases, it was found sufficient to give the full diet of the house (Case CCXVIII.), to which, in unusually severe cases, two or three ounces of lemon-juice with wine were added (Case CCXVII.) This, if the individual was not too prostrated before admission, always produced a cure in a period varying, according to the intensity of the disease, in from three to six weeks. The vast majority of cases entered the house between the months of January and August.

Dr. Christison, who has given a most able history of the epidemic as it was observed in Edinburgh and in the Perth Penitentiary,* conclusively shows that to the absence of milk, or its equivalent nitrogenous constituents, much of the disease was owing. In the Perth Penitentiary treacle-water had been given instead of it, and on restoring the milk no fresh cases occurred. Dr. Lonsdale again showed, that in the agricultural valleys of Cumberland, milk was abundant,† and that the absence of potatoes and fresh vegetables was the evident cause. The probably correct conclusion is, that health demands a varied diet, and that a too rigid abstinence from milk and fresh meat, as well as from vegetables, may occasion the disorder. The observations of Dr. Christison unquestionably prove the anti-scorbutic properties of milk and of the full diet of the Edinburgh Infirmary, as these very frequently constituted the only treatment of individuals who recovered rapidly.

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* Reported by Mr. J. Robertson, Clinical Clerk.

The following table, drawn up by Dr. Christison, shows the nutritive proximate principles in various dietaries, healthy, convalescent, and scorbutic. The numbers represent ounces avoirdupois.

		NON-NITROGENOUS.			NITROGENOUS.					
	Total.	Starch.	Sugar.	Fat.	Gluten.	Legum.	Album.	Casein.	Mus. fib.	Total.
I. HEALTHY.										
1. Scott. Prison standard...	25·2	17·8	1·32	0·11	3·96	0·13	0·03	1·36	0·55	6·03
2. Glasgow Prison, 3d rate	25·0	18·2	0·82	0·16	4·07	0·13	0·04	1·36	0·23	5·83
3. Edinburgh Prison, do.	24·3	17·8	1·56	0·13	3·89	0·25	0·04	0·38	0·23	4·79
4. Millbank Prison, 1821...	25·0	19·4	...	0·55	3·01	0·47	0·36	...	1·21	5·05
5. Do. Convicts, 1840	23·1	17·9	...	0·57	3·06	...	0·23	0·40	0·99	4·74
6. Dublin Bridewell, 1847...	19·5	13·4	0·03	0·60	2·93	...	...	1·57	0·94	5·49
II. CONVALESCENT.										
7. Edin. Inf. full diet	19·4	11·6	1·10	1·26	2·36	...	0·01	1·50	1·65	5·52
8. Fever conval. diet.........	20·1	11·1	1·50	3·88	1·82	...	0·49	0·03	2·16	4·40
III. SCORBUTIC.										
9. General Prison, 1846	24·2	17·8	1·56	1·11	3·96	0·13	0·03	0·07	0·55	4·74
10. Millbank Prison, 1823...	20·9	16·6	...	0·20	3·80	...	...	...	0·30	3·98
11. Do. Soldiers, 1840-1......	18·9	15·3	...	0·38	2·97	0·23	...	...	0·78	3·78
12. Do. do. improved, 1841...	19·2	15·0	...	0·38	3·04	0·21	0·04	...	0·64	3·89

NOTE.—1. The standard third rate diet of the Scotch prisons, as used in the General Prison at Perth, in healthy years. 4. Diet of Millbank Penitentiary, London, before being changed to No. 10. 5. Millbank diet of civil convicts, who remained free of scurvy, while the military prisoners were attacked under the diet, No. 11. The data given by Dr. Baly, physician to the prison. 6. The present diet of the Dublin prison, where male convicts are kept for long terms. 7. Edinburgh Royal Infirmary full diet, under which scorbutics promptly recovered. 8. Convalescent diet of a fever patient of the wealthy ranks, rapidly recovering flesh and strength. 9. Diet of the General Prison before the scurvy broke out. 10. Ditto before the Millbank epidemic at London in 1823. 11. Ditto before the military prisoners in Millbank Penitentiary were attacked with scurvy in 1840-41. 12. Improved diet on that occasion, but found ineffectual.

The individuals subjected to the dietaries in the I. and III. Divisions were all in confinement for long terms.

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* Monthly Journal of Medical Science, June and July 1847. See also Dr. Ritchie on Scorbutics, as it appeared in Glasgow at the same time. July and August 1847.

† Op. Citat., August 1847.

Dr. Garrod,* from an examination of the composition of food, under the use of which scurvy was capable of occurring, as well as of such substances as had been proved beyond doubt to be anti-scorbutic, was led to the conclusion that the absence of potash was the cause of scurvy. In this way he shows, 1st, That potash is deficient in scorbutic diet; 2d, That all bodies proved to be anti-scorbutic, including fresh meat and vegetables, milk, lemon-juice, etc., contain a large amount of potash; 3d, That in scurvy the blood is deficient in potash, and the amount of that substance thrown out by the kidneys is less than what takes place in health; 4th, That scorbutic patients, when kept under a diet which gave rise to the disease, recover when a few grains of potash are added to their food. The salts of potash, such as the nitrate, oxalate, and bitartrate, are well-known anti-scorbutics, but the efficacy has always been ascribed to the acid rather than to the alkali; 5th, That deficiency of potash in the system seems capable of explaining some of its symptoms, especially muscular weakness, as potash is a necessary constituent of the muscular system. These views undoubtedly merit attention, and it is much to be regretted that they were not made known until the epidemic which had called them forth had disappeared.

POLYDIPSIA.

Case CCXIX.†—*Sudden Polydipsia—Incurable.*

History.—Margaret Shearer, a French polisher, æt. 34, a mother—admitted May 31st. States that a year and a half ago she went to work at six o'clock, A.M., in her usual state of good health, and at eight o'clock, two hours afterwards, was suddenly seized with great thirst, which has continued ever since, accompanied by excessive discharge of urine. About three months afterwards, she was obliged to give up work on account of a pain in the loins. At various times she has experienced loss of appetite, nausea, fulness of the abdomen, palpitations, constipation or diarrhœa. Thinking that her strength had diminished of late, she entered the Infirmary.

Symptoms on Admission.—On admission, the amount of urine passed in twenty-four hours was 424 ounces—pale in colour—of sp. gr. 1005, not coagulable by heat or nitric acid, and containing no sugar, as determined by Trommer's test. She is a stout able-bodied woman, and speaks of occasional slight complaints. She has a pale countenance, furred tongue, and dry skin; but in every other respect is quite healthy. Dr. Alison, who first treated her, ordered warm baths and astringents, and afterwards galvanic shocks to be passed through the epigastric region. On taking charge of the case in the middle of June, I ordered bitter tonics, and the diet was carefully arranged, and the amount of water drank limited, and mixed with milk and a little magnesia. No change, however, occurred, and she confessed that she could not admit of restraint with regard to the amount of drink. During the whole month of July, she was weighed daily, and the amount of water drank and emitted from the kidneys carefully measured. Her average weight was eight stone, which underwent little variation. The amount of water drank varied from 370 to 520 ounces, the average being 440 ounces. The amount passed varied from 350 to 500 ounces; and it was observable that it was always from 20 to 50 ounces less than the quantity drank. The sp. gr. varied from 1001 to 1005, and was frequently tested for sugar, with the uniform result of its never being present. The bowels were generally open every other day, and the stool was of normal consistence and healthy appearance.

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* Monthly Journal of Medical Science, January 1848.

† Reported by Mr. James Thorburn, Clinical Clerk.

Progress of the Case.—From the 9th to the 14th of July, I tried the influence of narcotics, and she took three grains of opium daily, with ʒiss. and then ʒij of solution of morphia. Under this treatment she frequently appeared drowsy and stupid, but sound sleep was never prolonged, and no diminution of the thirst and diuresis was perceptible. She then took large doses of gallic acid, and subsequently, at her own request, cod-liver oil, under the use of which she became stouter, stronger, and the appetite improved. *August 22d.*—All other treatment was suspended, and she was ordered to take ten minims of the liq. iodini. comp., which was continued to the 14th of September without any effect. On the 16th she was ordered ℞ *Mass. pil. aloet et myrrhæ* ℈j; *Ferri. sulph.* ℈ij; *Ext. hyoscyam.* ℈ij. *Ft. massa in pil.* xij *dividenda. Two pills to be taken twice daily.* On the 26th there was diarrhœa, when the pills were discontinued, and an astringent mixture ordered. The report on the 1st of October is—general health good, and from an observation made for the first seven days of this month, it appears that the thirst and diuresis have somewhat diminished, the amount of urine varying from 280 to 350 ounces. There was no further change up to October 10, when she left the house.

Commentary.—I prefer calling this case polydipsia to diabetes insipidus, as frequent careful inquiry established the fact that it commenced with thirst, and that the increased flow of urine was a simple result of the quantity of water drank. In the present state of science, no reasonable theory can be conceived, explanatory of the fact, that a woman, apparently in good health, is suddenly seized with great thirst, and thereupon drinks two or three gallons of water daily, passes a corresponding quantity of urine, and that this continues for nearly two years without any marked change in her health. Where there is no scientific indication, the treatment is wholly empirical, and even the results of experience are wholly negative and useless. Astringents, diaphoretics, galvanic shocks, narcotism by means of opium, cod-liver oil, iodine, and purgatives, all failed. The latter, by increasing the alvine discharges, diminished somewhat the excretion of urine, but we could not flatter ourselves that she was in any way benefited by her four months' treatment in the Infirmary.

CONCLUSION.*

The Ethics of Medicine.

Gentlemen—After a lengthened period of study, and a series of examinations, intended to test your amount of knowledge, you have received the degree of Doctor in Medicine, the highest academic honour it is in the power of any University to confer. The direct connection which has hitherto existed between you and your teachers here terminates, and all those restraints which public opinion and legal forms have imposed upon the uneducated, are removed. The energies which you have hitherto employed in acquiring the necessary preparatory information, you may now dedicate to the practical affairs of life. In short, gentlemen, you this day obtain a high status in society, and without, I hope, ceasing to be students, you become members of a liberal and highly honourable profession. Such an event constitutes an important epoch in the life of every man, and is well calculated not only to excite deep feelings of reflection in yourselves, but those of lively emotion in all who are concerned (and who is not?) in the progress of that art which is directed to the prolongation of life and the cure of diseases. It will not, then, be considered superfluous if, before you leave this institution, and, in obedience to established usage, a member of the medical faculty seizes the opportunity of offering to you a few words of advice, of pointing out the importance of your future profession, and describing to you the spirit in which it ought to be practised.

I. The first piece of advice that I shall take the liberty of offering is, always *to cherish a feeling of deep responsibility.* A medical man is the earthly arbiter of life and death. He is the guardian of our race through the dangers of birth, and the perils of infancy. He is called upon to treat the different maladies which can afflict the human frame, under every circumstance of climate, age, sex, or condition; and lastly, when all means fail to prolong life, it is his duty, if possible, to alleviate those pangs, and diminish those sufferings which accompany the separation of the soul from its present dwelling-place. If, then, we regard him as the soother alike of the entrance and the exit of this life, as the first and the last friend of frail humanity, and if we further consider him, in the social scale, as the superintendent of all public and private institutions for the sick and the insane, as the adviser of legal tribunals in the administration of justice, and as the regulator of the sanitary conditions of armies, fleets, and, indeed, of nations, it is scarcely possible to conceive a vocation in which every feeling of duty and honour ought to incite to activity and usefulness; to the cultivation of his intellectual powers and resources; to a life of beneficence and integrity, and, above all, to a sense of the most overwhelming responsibility. This feeling is one which the most experienced and able practitioner can scarcely shake off, and which ought to press, with enormous force, upon those who are newly called upon to decide concerning the awful affairs of life and death. A fellow-creature having received some violent accident, or attacked by acute disease, calls upon you for assistance. There may be no more experienced practitioner near; there is none to consult with; the danger is imminent, and you feel conscious that not only something must be done immediately, but that what is done may save or destroy. Then there rushes upon your mind a peculiar feeling of dread and anxiety, rendered more embarrassing, perhaps, by the conviction that your future prospects may be influenced by the manner in which you conduct the case before you. Such a circumstance, as I have supposed, may happen to any of you at the commencement of your career, and it is then, you will perceive, that the only true support to be depended on, is a consciousness that you are enabled to put in practice all those means which the present condition of the science and the art of medicine have recognised as being correct. At such moments there will be impressed upon you the conviction that the good of your patients, and your own mental tranquillity, are intimately united; you will see the advantage of having studied your profession, not merely as an object of gain, but from a love of its intrinsic excellence—not because it brings you consideration and respect, but because it enables you to do good and to relieve suffering—not with a vain effort at exhibiting your superior knowledge, but with that humility which is the necessary result of true wisdom.

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* An address delivered as promoter of the Medical Faculty to the graduates in medicine. August 1, 1849.

The object of medicine is to preserve health, prolong life, cure diseases, and thereby to forward the happiness of mankind; and it is evidently the duty of those who practise it, to lose no opportunity, and to adopt every means of prosecuting that object to its fullest extent and in its widest signification. With this view, gentlemen, your past studies have been directed to the acquirement of various kinds of knowledge, the purpose of which has been not merely the obtaining of professional rules, but enlarging the mind, and cultivating the reasoning powers. The time has now arrived when you must concentrate the miscellaneous information you have gathered together, in order better to carry out that particular kind of practice which you in future intend to pursue. Any of the so-called accessory sciences may (should your tastes allow) be still further prosecuted, but not to the exclusion of more important matters. Your duty is to cure the sick and relieve suffering, and not to be distinguished as a chemist, a botanist, or a naturalist. Neither is it expected that you should have all the knowledge which each of your teachers possesses in his especial department, but that from the whole you should have obtained such a sum of learning, and such an available kind of information, that you may undertake the serious duties of a medical practitioner with credit to yourselves and advantage to the public. Such an amount of knowledge is within the reach of all; and should there have been any deficiencies or omissions in your past career, you are imperatively called upon to remedy them at once. Perhaps it is unnecessary for me to say your education is not complete; indeed, in one sense, it may be said to be only beginning. Hitherto, you have depended on others, now you must advance by yourselves—the information of collegiate life must be perfected and elaborated, in order to meet the exigencies of every-day affairs. You must prune away those imaginings in which the student loves to indulge, and direct your thoughts to the stern realities before you. For this purpose, you should seize the interval which may elapse between your retirement from the schools and the commencement of actual practice, in arranging your past acquirements for ready use, and in extending, by every possible means, your experience in the observation and treatment of disease. By so doing, I consider you will be best qualified to meet the serious responsibility you have to undertake, and will thereby attain that comfort of mind and true respectability which the proper and enlightened exercise of our noble profession can alone secure.

II. This leads me, in the second place, to impress upon you *the importance of practising the art and cultivating the science of medicine, in a spirit of sincerity and of truth.*—It is a well-known fact, that whilst the public can judge with tolerable correctness of merit in any other profession, it is wholly incapable of forming an estimate of ability in medicine. The structure of the human body, the functions it performs, the laws which regulate it, and the derangements which affect it, are to mankind in general completely unknown. All that your patients will concern themselves with, are results—but so ignorant are they of the means by which results are obtained, so little do they know of the operations of nature as distinguished from those of art, that they are especially liable to be led into erroneous conclusions. In consequence, unprincipled persons, from time immemorial, have successfully practised on public credulity, and some specious but shallow theory, some vaunted nostrum, some peculiar accomplishment, or some singularity of manner, have each in turn been made the means of imposition. It is expected of you, gentlemen, that you are so well grounded in the facts and principles of medicine, as to be enabled, on all proper occasions, to put down ignorant presumption, refute false doctrines, and expose artful knavery. You will remember that medicine is a progressive science, and that whilst the wise and learned who have cultivated it have done much, more remains to be accomplished. You will therefore readily acknowledge its imperfections where such truly exist, and prefer a frank avowal of ignorance to a false assumption of knowledge.

There is one great difficulty you will have to encounter, viz., that the rules and principles which guide the profession, in the course of time undergo a considerable variation. The arts and luxuries of life, the physical changes of the globe, and the differences of education and civilization to a certain extent, modify the constitution of man and the diseases to which he is subject. Maladies described as existing in former times are now unknown, whilst others are altogether of modern origin. It is of the utmost consequence, therefore, that the medical practitioner should be alive to the importance of following the progress of his art, and not imagine that at any time he has learnt all that is useful, or that he can ever reach that point where improvement is not to be gained. At the same time, he must learn, amidst the multitude of suggestions, the number of theories, and the opposing statements which will perplex him, to reject what is worthless, and only adopt what is truly useful. In all such cases, the best rule is to be on your guard against loose and confident plausibilities, especially where such are advanced not in their true character as hypotheses, but as established laws which are to regulate your practice at the bed-side. It is sometimes allowable to give a certain rein to the imagination, and cultivate that power of generalization which has led to the most important and brilliant results in science; but if this be not controlled within its proper limits, nothing can be more mischievous, especially when the errors may affect the lives of mankind. Strive, then, so to improve your intellectual resources and observing powers, that you may be enabled to shun error and admit truth, especially avoiding all those easy and fallacious paths to knowledge, into which the interested endeavour to entrap the unwary.

A desire to practise your profession in sincerity and truth, will also lead you, in cases which you have not particularly studied, or which demand special kinds of treatment, to require the assistance of some brother practitioner. No two persons prosecute their studies in exactly the same direction; and the subject of medicine is so extensive, so complicated, and requires so much application, that it is almost impossible for a single individual to become master of the whole. Vanity and self-conceit, it is true, have led some men to maintain the contrary; but where is the individual who is at the same time a good physician, a good surgeon, and a good obstetrician? There are many, doubtless, who practise very usefully in all these branches, and you may be so circumstanced hereafter as to do the same. If so, you will necessarily be often consulted in cases where you must feel internally convinced that you cannot do full justice to your patient, and then it will be right to bear in mind, that if you possess a greater share of information in some respects than others, that they in certain particulars know more than you. Do not, then, be deterred by a false feeling of shame, or a desire for gain, from consulting your medical brethren; reciprocal services beget mutual kindness, and it is at all times better to resign the treatment of a case you do not understand, than subject yourselves, by undertaking it, to a perpetual series of mortifications and disappointments. By exercising your profession, then, in a spirit of sincerity and truth, you will be animated by a proud desire to advance its claim to public confidence, rather than your own immediate interests; you will despise the miserable vanity of announcing what is new, without a scrupulous regard to its being correct. You will, while retaining the right of thinking boldly for yourselves, not forget that observation is difficult, theory imperfect, and experience frequently fallacious. You will not, therefore, rashly substitute your own authority for that of those whose knowledge is more extensive, or commit yourselves to the ephemeral doctrines of the day, by which a few otherwise respectable men have lost their professional reputation. You will remember that the conclusions of youth are almost always modified by the experience of age; and that the wisest and most eminent men of science have given the best proofs of a solid understanding, by the readiness with which they have acknowledged their own ignorance.

III. The third and last point to which I shall direct your attention is, that *you ought to be strongly imbued with a sense of duty and of moral obligation.* No profession demands that its members should be governed in their practice by purer principles of honour than our own. The medical man is received into the bosom of private families, where he is intrusted with matters of such a nature, that, if they were disclosed, they would be attended with the greatest distress, and would plunge parents or children into the most bitter and poignant agony. It is your office not only to regulate the corporeal, but, in many cases, the mental derangements and irritability of your patients; but who can govern the minds of others, if they are incapable of commanding their own? Prudence, sobriety, kindness, and delicacy of feeling, are therefore especially enjoined upon those who treat the sick. It is true, you will labour among scenes of woe, and have to watch incurable diseases, and loathsome maladies; but he whose sensibility is thereby blunted, and who can look with indifference on the agonies of a fellow-creature, will seldom feel that anxiety, or experience that watchfulness, which is so necessary for detecting the true condition of his patient. Self-interest is the worst of all models for a medical practitioner, and is a vice which our profession may proudly claim exemption from. You, I trust, will never experience it, but rather those pleasurable emotions which result from lessening human suffering, without thought of profit, and from exercising friendly offices with that politeness and delicacy of sentiment which distinguish every man of a gentlemanly and refined mind. Mixed, as you occasionally will be, with every branch of society, you must expect sometimes to meet with ingratitude, and be ignorantly charged with committing errors undeservedly. All men are liable to misrepresentation; and although I do not, at such periods, advise you quietly to submit to insult, I strongly recommend great circumspection in manifesting resentment. "Unjust suspicions may attach to an innocent man; the general consistency and integrity of his life will wipe them away; the imprudences of youth may be repaired by the circumspection of middle age; but if you once lose your reputation for professional prudence and honour, you will find, whatever be your attainments, that your influence is gone, and that you are, in all respects, lost and ruined men."

In addition to the duties which you discharge to the public at large, there are others of no less importance which you owe to yourselves. Opportunities will frequently occur, where you may, by looks or words, seriously injure the reputation of some brother practitioner, when in reality he does not deserve it. The period of the disease, or the circumstances which have occurred, may enable *you* to do what your predecessor could *not*. Every good feeling demands, that under such circumstances, you should explain the cause of your success to the patient, and not allow him to suppose his previous attendant was in fault. Besides, the most scientific and experienced physician may sometimes err unavoidably, and you must never attempt to aggravate the consequences of his failure, by adding to the patient's dissatisfaction. Conduct of this kind will cause the offender to be shunned, and sooner or later to feel that no success, and no wealth, can compensate for the absence of self-esteem, or the good opinion of the enlightened and honourable men of his own profession.

Gentlemen, habitually engaged as you will be at the bedside of the sick and the dying, you will have abundant opportunities of rightly estimating the insufficiency of mere worldly considerations. I think you will find, notwithstanding what is said to the contrary, that there is no class of society in which the true spirit of religion is more extensively diffused than among members of the medical profession. True, they shrink from an officious and public manifestation of it, and their habits of thought teach them to distinguish between trifling forms and essential truths; but I know of no calling more practically engaged in acts of charity, in an abnegation of self, a desire to do to others what we wish others should do to us, and an endeavour, if occasion require it, to afford all those consolations which a pure Christianity can alone impart. This has ever been the conduct by which all the brightest and most eminent characters in our profession have been distinguished, and I earnestly pray that such may be yours.

And now, gentlemen, I and my colleagues bid you farewell, trusting that whatever part you are destined to fulfil in the affairs of life as medical practitioners, you will ever labour under a deep sense of responsibility, that you will always act in sincerity and truth, and ever be governed by a high feeling of duty and of moral obligation. Let us hope that you will regard your past teachers as your future friends, and that in whatever part of the world, however distant, your lot may be cast, we shall still be united by a chain of good feeling and mutual esteem, which, however it may be lengthened, can never be cut across. We desire that you will consider the reputation of this University as in some degree identified with your own, and that, whilst on the one hand you will take care never to sully the degree she has this day conferred, on the other you will, by constant good conduct, and by well-directed endeavour, add fresh lustre to the reputation she holds among the academic institutions of this great country.

APPENDIX.

Reply to the Objections which have been urged to the Author's Remarks on the Treatment of Internal Inflammations.

At page 289 I stated that the subject of change of type in inflammations, and the recent modifications in their treatment, were, when those pages went through the press, being discussed, and that, should new facts or views be elicited, they would be noticed in the form of an appendix. So much, however, has been published in reference to the observations which will be found in the present work, pp. 260 to 289, that it will be impossible for me to allude in detail to all that has been said. It is evident that the definition of the word inflammation, the ideas to be attached to the pathological condition it expresses, as well as all that refers to its causes and treatment, require to be re-systematised, in order that our present knowledge of the pathology of the process may be proved to be in harmony with modern practice. To this task I shall address myself, as soon as my avocations will permit. In the meantime I propose saying a few words in reply to the more important objections which have been made to my remarks.

In a paper published in the *Edinburgh Medical Journal for May* 1857, Dr. Alison has cited some cases, and one especially, recorded by Dr. Gregory, where, after large bleedings, recovery took place. The graphic account of such cases is well calculated to make a strong impression on the public, and even on the minds of some professional men, although it is difficult to see how isolated cases bear on the question at all. According to Dr. Gregory, a young man enters the clinical wards after several days' illness—neither he nor his pupils had any doubt as to the nature of the disease (pleurisy), the urgent nature of it, or the proper remedy for it (bleeding); he was bled largely and repeatedly in consequence, and recovered, in Dr. Gregory's opinion, much faster than such patients ordinarily do. Now, this case differs in no particular from those of other young men constantly to be seen in the wards of M. Bouillaud, at la Charité Hôpital, Paris; and there is no proof whatever that the practice adopted by Gregory in past, or by Bouillaud in modern times, cuts short the progress of the disease one hour, however it may have modified the symptoms. Yet, so important does this case appear to Dr. Alison, that he observes of it, "if we were to think it necessary to suppose that such bleedings as those described by Dr. Gregory in the case read, were only injurious to the lungs of the man who left the hospital apparently well within a fortnight (this does not appear from the case) after the violent pleurisy, and all these bleedings besides, I should think these facts alone quite sufficient to stagger my belief in any such theory."

But I have never maintained such a theory. On the contrary, I have *proved* that two persons out of every three treated in this way for pneumonia, in public hospitals recovered; and there can be no doubt that the medical men who practised these bleedings conscientiously believed, and many of them still believe, that they were beneficial, and saved the lives of their patients. But I have also *proved* that recovery is more frequent and more speedy when there are no such bleedings, and, if so, the conclusion seems irresistible, that, as a rule of practice, they are inert or injurious. What is required to show the excellence of Dr. Gregory's practice, is not a description of the cases which recovered, but a demonstration that a greater number of persons affected were saved by it than there would have been under an opposite treatment. But as there are now no data whereby we are enabled to judge of this, it still appears to me that no reliance can be placed on the experience of Cullen and Gregory as to the general effects of bleeding.

Dr. Alison, however, contends that blood-letting, to be useful in pneumonia, should be practised during the first three days, and that, if certain characteristic symptoms are present, it is not safe to dispense with it. On this point I have only to remark, that the records of the Royal Infirmary, during the period when blood-letting was largely practised, *prove* that bleeding was seldom had recourse to there at that early period, even by Dr. Alison himself. If it be now urged, that that explains the great mortality, I reply, it may have assisted, inasmuch as the earlier a bleeding is practised, the less dangerous it is. With regard to its not being safe to dispense with it, I have also *proved* that in all places where pneumonia has been largely treated without blood-letting, the mortality, so far from being increased, has invariably diminished. In confirmation of this important result of modern experience, I may cite a passage from a letter I received from Dr. Arthur Mitchell, dated Vienna, April 2d, 1857, in answer to one of mine, requesting him to furnish me with the conclusions of the Viennese physicians. He says—" I have met no man here who will entertain for a moment the idea that the change in the treatment of pneumonia has resulted from any change in its type. They say that when physicians became more expert in the physical examination of pulmonary disease, they found that bleeding did not affect, in a favourable manner, the *real* progress of the disease, and therefore they were led to discontinue it. They all seem to be of opinion, however, that although there is, as the result of this change, a diminution of the mortality, it is not very great, but that the recoveries are quicker and much more satisfactory."—(See also Dr. Mitchell's Paper on the Statistics of Pneumonia in Vienna, *Edinburgh Medical Journal*, November 1857). No more satisfactory proof could be given of the influence of modern diagnosis on the treatment of disease.

I beg, therefore, again to repeat, that "the real tests of successful practice are not to be sought for in the relief of symptoms, but in the removal of the disease; and that that treatment will be best which, *cæteris paribus*, is followed by fewest deaths, and leads to recovery in the shortest time." See p. 281.

Dr. Alison seems to suppose that my observations were made principally on the dead body. But, in fact, they have been made on the transparent parts of living animals, as well as on patients labouring under inflammation, and all the phenomena observed in them I have found perfectly consistent with what was discoverable after death. Neither have I ever asserted that exudation of liquor sanguinis, in order to constitute inflammation, must be visible to the naked eye. On the contrary, I have always maintained that those who have not studied this morbid process with the aid of high magnifying powers, can know very little of it, inasmuch as all the primary changes are invisible to unassisted sight.

But the question is not *how* a doctrine is arrived at, but whether that doctrine be true and consistent with all known facts? On this point Dr. Alison argues that inflammation is not, as I have defined it, viz., "a change in a part characterised by the exudation of lymph through the walls of the minute vessels, resulting from changes more or less well marked in the nervous, vascular, sanguineous, and parenchymatous elements of that part," p. 262. He adheres to his former statement, viz., that it is "the *tendency* always observed, even when these changes have been of short duration, to effusion from the blood-vessels of some new products, speedily assuming, in most instances, the form either of coagulable lymph or pus," etc. The difference between us, then, is this, that whilst I call active congestion *plus* exudation inflammation, he says it is active congestion *plus* a tendency or *nisus* to exudation. But how, in any given case or group of cases, this "tendency" to a certain act can be separated from the act itself, or how, if it can, it is to be recognised in the living body, so as to constitute a foundation for practice, Dr. Alison has not informed us. It is evidently an assumption which, even were it true, could never lead to any advancement in our knowledge, or improve our treatment. For, if it be affirmed that congestion, in any given case, presents a tendency to exudation; and if on bleeding no exudation follows, how is it possible to know whether the tendency was present? But when, as most frequently happens, exudation occurs, and continues to spread notwithstanding bleeding, it is then only we have any proof that such tendency existed, together with the certainty that in all such cases the remedy has failed to fulfil its supposed function.

This assumption of what is the tendency of morbid lesions, prevails largely in the writings of medical men, who assert that a certain disease, of the nature of which they often know nothing, has a tendency to destroy texture and kill; and that in some cases (as phthisis) remedies are useless in arresting it, whilst in others (as pneumonia) their application cuts it short. I have long maintained, and this seems now to be generally admitted, that the notion of the necessary fatal character of phthisis was erroneous, and that it *can* be arrested by art,* while, in the present work, I contend that pneumonia is by no means a fatal disease in sound constitutions, and *cannot* be cut short. This last proposition I endeavour to prove by establishing three series of facts, viz.—1st, That when the tendency to inflammation was generally attempted to be checked by antiphlogistics, there was a great mortality (1 case in 3); 2d, That a pneumonia, when established in sound constitutions, runs through its whole course, including exudation of lymph and suppuration, without any destruction of tissue at all (Cases CXXV. to CXXXIII.); and 3d, That when a treatment is adopted to favour these processes, instead of trying to check them or cut them short, the former great mortality of 1 case in 3 is diminished to 1 case in 21⅗. These facts appear to me irreconcileable with the opinions and statements still put forth by Dr. Alison.

With regard to what Dr. Alison calls the "ingenious speculation" contained in my third proposition; it is satisfactory to me to observe that he agrees with it. But this so-called speculation is, in fact, an attempt to show that the mechanical principles which have hitherto guided practitioners in their attempts to cut short internal inflammations by bleeding, are erroneous, and not in harmony with the present advanced state of pathology. In other words, my third proposition (p. 266, *et seq.*) points out that the preliminary, essential, and resulting changes of this morbid process, are essentially *vital* in their nature, and require, for their perfect and healthful performance, that the vital force of the economy, so far from being depressed, ought to be maintained, and, if necessary, supported. If, then, so acute a thinker as Dr. Alison has detected no fallacy in my reasoning, I may be pardoned for considering this proposition as having been clearly demonstrated.

In a discussion of this kind, it would be easy to meet opinion with opinion, assertion with assertion, and case with case; but I decline to do so, because such a mode of procedure cannot, under existing circumstances, lead to a solution of the questions at issue. My object has been to furnish a contribution towards the settlement of an important point of practice. This I have done, 1st, By showing how the modern views of physiology and pathology have superseded the doctrines which formerly prevailed; and 2d, How an improved practice has of late years taken place, and brought about diminished mortality, and more rapid convalescence in pneumonia. If what I formerly stated fails to convince, a mere repetition of the facts and arguments advanced will not do so, and we must wait for further results. Hence, it is not my purpose to follow Dr. Alison into what may be the proper practice in many diseases he has alluded to. Neither is it necessary to enter into a lengthened refutation of the idea, that the natural progress of an inflammation is like the burning of a house, nor of the application of Archbishop Whately's remarks on the action of fire-engines, to the *modus operandi* of blood-letting. I would only remark how curious it is that now, as in ancient times, analogies should be drawn between blazing buildings, and that morbid process unfortunately named from the latin word *inflammo*. To suppose that inflammation has any relation to burning with fire, is about as reasonable as to imagine that a growing tree or animal is being consumed.

In a subsequent communication inserted in the *same Journal for October*, Dr. Alison says:—"I believe it to be a matter of *real practical* importance, that practitioners in all parts of the world should make up their minds without delay as to the question, whether or not there is sufficient evidence of such *changes of type* of inflammatory diseases, as are described in several of the inclosed extracts of letters with which I have lately been honoured—being part of the general dispensations of Providence as to those diseases, and, as far as we yet know, an ultimate fact in their history." But on careful perusal of the letters published with that paper, I found, it is true, strong opinions stating that the type of inflammations has changed, together with some cases which have recovered after large bleedings, but not one fact or argument to support the doctrine now advanced by Dr. Alison, that such change of type is an ultimate fact or law in the history of inflammations. Surely a conclusion of such importance ought to be based on something more positive than the fluctuating opinions of medical practitioners, however eminent they may be. Experience alone is exceedingly fallacious, for there is such a thing as experience in wrong as well as in right; and notwithstanding my great respect for the originator of this doctrine, I think, it would not be becoming in us, with due regard to the interests of science, to yield to the authority of distinguished practitioners of the art, unless they can show that their theory, like every other that is really correct, is consistent with all known facts. To this test every theory must be put, from whatever high authority it may originate.

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* On "Pulmonary Tuberculosis," 8vo, 1853.

Now, at p. 263, *et seq.* in Proposition 2, I have pointed out that we have no facts to show that the pulse and general vigour of the constitution have undergone any change for the worse among mankind. It so happens that there is no subject in all physiology with regard to which we possess more elaborate and more exact information than we do concerning the pulse. Hales published a remarkable series of experiments, in reference to the static force of the pulse in 1731, and similar observations made by Poiseulle in 1828, by Valentin in 1844. by Ludwig in 1847, and by Vierrordt so late as 1855, show that no great variation has taken place during 127 years. What proof has been advanced by the supporters of change of type to show that it has? Certainly none whatever.

As to the vigour of the human constitution, the theory, if it means anything, proceeds upon the supposition that when a man of average strength now-a-days is seized with inflammation, he presents all the symptoms that used to be observed in a weak one. This is asserting that the human race has so degenerated within the last twenty years, that the lowering treatment which formerly was beneficial is now injurious. But so far is this notion from being supported by facts, that it might easily be shewn that men in these countries are now more vigorous, better fed, clothed, and housed, and that human life is more valuable than it was formerly. Mere opinion, however, could never establish one doctrine or the other. Some have even gone so far as to attempt an explanation of the suppositious fact, thinking that the use of potatoes, of tea, or the introduction of railways, has something to do with it. Dr. Watson is of opinion that it is attributable to the epidemics of cholera, which "leave traces of their operation on the health and vitality of a community, long after they have ceased to prevail as epidemics." (*Practice of Physic,* 4th edition, p. 97.) Mr. Robertson of Manchester is satisfied, from experience, that it is since the boil epidemic appeared, that the change has taken place (*Edinb. Med. Journal,* Oct. 1857, p. 299). Surely it would be well, before speculating as to causes, to determine, in the first place, whether the alleged change in pulse and type has taken place at all. How often do our senses deceive us, when objects are at hand! how little can they be depended on when it is simply asserted by this or that practitioner, that a pulse was stronger twenty years ago than it is now! Yet we have no further evidence than this advanced by the supporters of a theory, which claims for its fundamental fact a diminished vital force in the heart and pulse of man and animals, to explain a change of medical practice.

Indeed it should not be forgotten that veterinary surgeons have also ceased to bleed in inflammations. Have animals then also degenerated, and is the type of organic diseases changed in them? This question was answered by a farmer, in the Scotsman newspaper for October 22d, 1857, as follows:—"Dr. ———, in his communication of the 15th ultimo, makes the startling announcement that physical and moral decay are undermining the vigour and energy which formerly characterized the inhabitants of this country; and, as a proof of the assertion that physical decay was at work, states that the free bloodlettings in the case of inflammatory diseases, which formerly was the practice, cannot now be resorted to with benefit. I am neither a medical man nor a veterinary surgeon, but I own a few horses, and other animals of the cattle and sheep tribes. How comes it, then, that some thirty years ago, when any of these animals were seized with any inflammatory affection, however slight, that profuse bleeding was resorted to, and with advantage? Now, however, the veterinary surgeon never bleeds save on very rare occasions; at the same time telling me that the animal cannot afford to lose any blood, and this treatment is equally successful as the former was. On Dr. ——'s principle, then, our horses should be physically inferior to what they were thirty years ago. Is this the fact? My experience says they are at least equal in physical power, energy, and vigour to what they were then. Do the horses of Glasgow or Edinburgh draw lighter loads; do our carts convey less grain to market; do we plough with a shallower furrow; do our race-horses run at a slower pace? The general answer will be, they do not. For instance, the last Derby was one of the quickest-run races on record. How does the doctor account for this on his theory?" I need scarcely say that the doctor has made no rejoinder.

If it had been contended that the greater vigour of the population had so influenced the symptoms as to have rendered dyspnœa, quick pulse, and other phenomena of weakness less apparent, it would have been more accordant with pathology. But as the former therapeutical rule was that bleeding was demanded only in cases of robust and strong constitutions, such a doctrine would have been inconsistent. In the meantime it seems to me apparent that there are no facts upon which the theory of change of type in inflammations can be based, as in any way explanatory of the change in our treatment.

Dr. Watson of London, in a recent edition of his work on *The Principles and Practice of Physic*, has added to the chapter on inflammation a note, in which he alludes to my remarks. He argues that Cullen and Gregory not being certain as to the exact seat of the inflammation, is nothing to the purpose, if they were competent to ascertain that inflammation was going on somewhere in the chest. But that they could even do this *with certainty*, is very doubtful. Besides, I argue against the general opinions of Cullen and Gregory as to large bleedings in internal inflammations, not only because they were incapable of separating pneumonia from other inflammations of the chest, but because, so far as we are now capable of determining, their practice was a fatal one; because those who have imitated it, and carefully examined the results, have found it to be so (Louis, Dietl); and because all those who have abandoned it, declare that not only do their cases get well as soon, but sooner, when blood-letting is not practised. Now, I can find no facts or arguments to controvert this position among the statements of my opponents.

Again: "Who," says Dr. Watson, "treats knowingly the extravasated products of inflammation by general bleeding?" The word "knowingly" here is all-important, because the fact is, Cullen, Gregory, and all those who followed them, did bleed largely after exudation had occurred. Hence, very probably the large mortality, and hence the difference between the first and second series of Louis' cases. But our improved knowledge of diagnosis having taught us how to detect such exudation, we now do not bleed under circumstances where our predecessors did. This is why I contend that the change of treatment is owing to an improved diagnosis rather than to a change of type. Then, as to pathology, Dr. Watson is of opinion that our knowledge, arrived at by chemical and microscopical investigation, is not yet complete or ripe enough to warrant any exclusive reliance upon it as a guide to treatment. But no one has ever contended for the exclusiveness of this or any other mode of investigation. That pathology, as a science, has of late years made rapid strides in advance, cannot be denied; and, if so, why should it not do in modern times what it has done in all times past, viz., suggest to our minds the reasonableness or unreasonableness of particular modes of practice? It is in vain telling us to adhere to the routine of our forefathers, when the principles which guided them are proved to be erroneous. But when, in addition to change in theory, actual experience demonstrates that we are right, when modern pathology and modern practice harmonize with and support one another, then it appears to me that the time *has* arrived for demonstrating the errors of former teaching, as well as of past empirical observations.

Dr. Watson also objects to statistics, as being inconclusive and liable to mislead, when applied to the treatment of separate cases of disease. Now no one is more thoroughly persuaded of the fallacies inherent in medical statistics than I am, and no one has more constantly pointed these out to others. (See *Monthly Journal of Medical Science*, October 1847). But the error of some statistics resides more in the jumbling together of different experiences, and of the cases of various practitioners, than in an endeavour thereby to arrive at the results of a particular practice in the hands of any one well-qualified observer. Surely the statistics of Louis on phthisis, and on the effects of bleeding in pneumonia, are trustworthy, as are also those of Grisolle and Dietl. And I venture to affirm that my own statistics of 65 cases of pneumonia may challenge the strictest inquiry into their accuracy. Then, no one, so far as I am aware, uses or withholds any given remedy merely *because* of numerical calculations, but, having seen occasion to try this or that practice, he determines its good or bad effects by counting as well as watching. Above all, he should watch and report on those who die, as well as on those who recover under a particular treatment, if he wish to ascertain its real value ; and what is this but counting cases ? Is such observation not better than arraying opinion against opinion, placing the vague statements of senior in opposition to those of junior practitioner, or contrasting the scholastic views of London and Edinburgh with those of Paris and Vienna ? Thus, when it is shown that of 65 cases of pneumonia which entered my clinical wards, only 1 in $21\frac{2}{3}$ died, but that of 75 similar cases which entered the wards of La Charité under M. Louis, 1 in $3\frac{1}{7}$ died ; then I think it reasonable to conclude, that, as in my cases the vital processes were furthered and supported, whereas in those of M. Louis they were diminished or subdued, the great mortality of 1 in 3 individuals affected was owing to the treatment, and that such is a legitimate application of statistics. When, moreover, I ascertain that this conclusion is borne out by the experience of other hospital physicians, then the conviction is forced on my mind, that the number of deaths from pneumonia is lessened in modern times in consequence of our change of practice, rather than of a change of type in the disease.

I cannot agree with Dr. Watson that the whole matter in dispute is virtually conceded, because I admit that symptoms are relieved by blood-letting. A rigorous antiphlogistic treatment was formerly put in force with a view of cutting short the disease. Now, this I contend is not done ; but, on the contrary, the real disorder is prolonged, and rendered proportionally more fatal by that practice. On the other hand, small bleedings, which do not lower the vital strength, are sufficient to relieve urgent symptoms ; it being recognised that the lesion otherwise is to be assisted in its natural progress. Surely this is a complete revolution in the principles, as well as in the practice, referable to internal inflammations. But that we should " so bleed as to secure the advantages of the remedy, and avoid its disadvantages," is a happy practical conclusion of Dr. Watson's, in which all parties must concur.

Dr. Bell of Glasgow, in the *Glasgow Medical Journal, July* 1857, has done me the honour of criticising my opinions and facts at great length, and has endeavoured to show that not only is my theory erroneous, and practice bad, but that even my phraseology is illogical and unmeaning. And yet a careful perusal of Dr. Bell's paper will only serve, I think, to establish that he confessedly does not comprehend modern pathology ; that his cases support all I have stated as to treatment ; and that he seems to understand my meaning tolerably well. Of 27 cases of acute pneumonia under his care in the Glasgow Royal Infirmary, admitted in the early stage, he says, 23 were sthenic and only 4 asthenic. These were bled, mercurialized, purged, and blistered, according to ancient usage, except that the amount of blood taken never exceeded 20 oz., the average quantity being 14 oz. All these cases got well. The duration of the treatment was eighteen days. Now, if these cases were really sthenic in character, and if they were cured by the means employed, then Dr. Bell is the strongest opponent of Dr. Alison's views that has yet appeared. But the fact is, all these cases entered the infirmary very early in the disease, before hepatization was far advanced, and would, I am satisfied, have got well much sooner than in eighteen days, had a lowering treatment not been employed. Besides, the very moderate bleedings practised at the commencement of the disease cannot be considered as an antiphlogistic, but rather as a palliative remedy. They did not diminish to any serious extent the vital power of the economy, hence the patients ultimately recovered.

The mischief of Dr. Bell's practice, however, will be best understood by quoting his general results, which are, out of 71 cases, 4 deaths, although the complicated cases, with phthisis and albuminuria, are not included. Of the cases in which hepatization existed on admission, he tells us that the average time they were in the hospital was 47 days, and the average time they were under treatment was 22 days. " This lengthened duration," he observes, " affords a startling commentary on the bad effects which *may be expected* to follow the natural plan of treatment recommended by Dr. Bennett." Startling indeed. An average treatment of 22 days, and a lingering convalescence of 47 days, with a mortality of four, after the exclusion of complicated cases, will not well contrast with my average duration of $14\frac{1}{2}$ days, and with the fact that the only three fatal cases I have had were just of that kind that Dr. Bell carefully excludes from his list. Had I followed Dr.

Bell's plan, there would have been no mortality among my cases at all. I have also calculated the average number of days my uncomplicated cases were in the hospital, and find it to be 25½ days, including the cases of double pneumonia.

Dr. Bell has also endeavoured to throw doubts upon the accuracy of my statements, and has demanded an explanation of his own erroneous conclusions with regard to them. This I shall give. On looking over some former cases of pneumonia published by me, Dr. Bell thinks he has discovered three fatal cases which are included in my series, but not counted. But he overlooks the obvious fact, that the first case was not treated by me at the commencement; that it was probably one of phthisis, a point, however, I could not determine, because, as stated in the commentary, "I had only just then taken charge of the wards." The second case was one of organic lesion of the heart, with Bright's disease, and the pneumonia after death was recent and vesicular—that is, confined to *isolated air vesicles*. Surely such a case is not one to be included among ordinary cases of acute pneumonia. The third was a case of either phthisis or *chronic* pneumonia of the apex, and of course, therefore, was not placed in the list of *acute* pneumonias. Hence then, these three cases are not included among my 65 cases. (I may here state, that since these statistics were drawn up, I have admitted into the infirmary 8 other cases of pneumonia, raising my numbers to 73, without the mortality being increased.) Again, Dr. Bell fancies that the same cases prove that I have not invariably treated every case of pneumonia by furthering the natural progress of the disease. He is again mistaken. It is true that in 1849 I was not so certain of the uselessness of bleeding as I am now, and did say of a case bled *before* admission, early in the disease, that the practice was judicious. I confess, also, to having thought then, and to having said, that a large bleeding before exudation comes on, *may cut short* its progress, etc. But I can see nothing so contradictory in all this as Dr. Bell does. Neither has my ordering antimonials, and applying a blister in a few cases, ever amounted to an antiphlogistic practice, or vitiated the general plan I have described.

All the facts contained in Dr. Bell's paper, therefore, it appears to me, fully bear out the correctness of the principles and practice which I have so long recommended in the treatment of internal inflammations.

Dr. Christison, in the *Edinburgh Medical Journal for January* 1858, thinks that Dr. Alison's view is supported by the changes which have taken place in the treatment of fevers. But I cannot see any analogy between inflammation of a part which gives rise to constitutional disturbance, and an essential fever originating in the blood from some morbid poison. I agree with Dr. Christison in thinking that we know little more of the pathology of fever now than we did forty years ago. But it is very different with regard to inflammation. The unknown and varying causes producing epidemics, are well illustrated in the case of cholera, which visits us at uncertain periods, for reasons of which we are profoundly ignorant. The causes producing inflammation in a part have always been the same, and are unchangeable. Unless, therefore, the non-bleeding in fevers should have shaken the confidence of practitioners in the use of blood-letting as an empirical remedy in all cases, I do not see how the treatment of constitutional fever under such different circumstances can correctly be compared with that of inflammation. Dr. Christison, like Dr. Watson, points out that I have advanced no argument to show that the febrile phenomena must always be the same. But I humbly think it is not for me to show that the human constitution is incapable of undergoing alterations. The *onus probandi* must be laid upon those who assert that any such change is sufficient to account for the remarkable modifications which have taken place in medical practice during the last twenty years.

Dr. Easton of Glasgow, in a clinical lecture published in the *Edinburgh Medical Journal for February* 1858, agrees with me as to the impossibility of inflammations undergoing any change of type, and believes that there is no analogy between the morbid actions of fever and inflammation. At the same time, he agrees with Dr. Watson, "that there are waves of time," which influence organic diseases. This seems to me rather contradictory, because if such waves of time exist, and if they modify inflammations, this is what Dr. Alison understands by change of type. He impresses upon his pupils "*the fact* (?) that in large towns, and more particularly in hospitals, blood-letting exercises an injurious effect on the vast majority of the cases of pneumonia which are now met with in these situations; while, on the other hand, it would be exceedingly improper not to admit, that in country districts, and more particularly if the disease be seen at the very outset, or shortly thereafter, not otherwise, cases *may be found* in which a single blood-letting will arrest the further progress of the disease." But where are these cases? Dr. Bell tells us that even in the Glasgow Infirmary, when patients enter at an early stage, they present a sthenic type, but he has not shown that one of his cases was arrested by blood-letting, and admits that, although treated early, their duration on an average was eighteen days. I fear I must be guilty of the impropriety (as Dr. Easton seems to consider it) of not admitting the probability of finding such cases, as well as of believing that the so-called fact is no fact at all. Dr. Easton also reminds me that exudation of liquor sanguinis is not necessary to constitute inflammation of the lungs, and continues: "Many cases of that disease are met with, while yet in the primary stage of engorgement; and that it ought to be our duty, by appropriate treatment—including even blood-letting if necessary—to prevent that very exudation which, without reason, without proof, and in defiance of all experience, he assumes to be the *sine qua non* of the malady." This is only a repetition of the argument of Dr. Alison, and is only adding assertion to assertion, and opinion to opinion. Admitting that cases in the stage of primary engorgement are met with, I ask both physicians, how are these to be recognised as cases of pneumonia? how are the constitutional symptoms to be separated from those of fever? and how, without exudation, are we to be satisfied that a blood-letting has cut short an inflammation? When these questions are answered, it will be time enough to say that my attempt to render the meaning of inflammation definite instead of vague, and to distinguish it from mere congestion or engorgement of the blood-vessels, is without reason, without proof, and in defiance of all experience.

But whilst several eminent men have thus opposed the principles of practice contained in this work, I am happy to know, that many able and distinguished physicians agree with me essentially in the views I have taken on this important practical subject. Among these, Dr. Todd of London has long successfully practised on principles which, if not identical, are closely allied to them; and Dr. Markham, in an able series of communications in the *Lancet for November and December* 1857, not only upholds them, but advances new, and, it seems to me, unanswerable arguments in their support.

That the extraordinary activity which, during the last fifteen years, has been communicated to the natural sciences, should fail to produce any change in medical practice, was scarcely to be expected, any more than that such change could be effected without great opposition and much discussion. Yet, singular to say, the discussion in this case, instead of preceding, has followed the change, inasmuch as many of those who are now contending for the advantages of blood-letting and antiphlogistics in inflammation, are the very parties who acknowledge that they no longer employ them. But, though tardy, the discussion may still be useful, should it serve to direct men's minds to what I conceive to be the true principles which should guide our endeavours to advance medicine. These are, 1st, That an empirical treatment, derived from blind authority, and an expectant treatment, originating in an equally blind faith in nature, are both wrong; 2dly, That a knowledge of physiology, pathology, and therapeutics, and not experience alone, is the real foundation for the practice of the medical art; and, 3dly, That a true experience can only have for its proper aim the determination of how far the laws evolved during the advance of these sciences can be efficiently made available for the cure of disease.

Determining Causes of Pulmonary Emphysema.

Since p. 605 has been printed off, Dr. Jenner of London has published a paper "On the Determining Causes of Vesicular Emphysema of the Lung," in vol. xl. of the London Medico-Chirurgical Transactions. According to him, "Violent expiration, being chiefly performed or greatly aided by the abdominal muscles forcing upwards the liver, etc., drives the air (in consequence of the highly arched form of the diaphragm in violent expiration) from the central part of the lung, not only through the bronchi towards the larynx, but also towards the circumference of the lungs, *i. e.*, towards those parts which are the least compressed during expiration." This theory seems to me to be correct, and to be supported by numerous well-known facts in the history of emphysema.

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